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Selected Groups of Civilian  
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By

W. Leslie Barnette, Jr.

Edited by Herbert S. Conrad

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# Psychological Monographs: General and Applied

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HERBERT S. CONRAD, *Editor*

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## Occupational Aptitude Patterns of Selected Groups of Counseled Veterans

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A dissertation in the Department of Psychology submitted to the faculty of the Graduate School of Arts and Science of New York University in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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\* \* \*

The statements made herein relative to Public Law 346 and Public Law 16 veterans are the sole responsibility of the author. They in no way imply any endorsement by the Veterans Administration of the opinions expressed or conclusions drawn from the results of the follow-up. My thanks, however, to Colonel Walter Ketcham, Chief of Advisement of the New York Regional Office of the Veterans Administration, who has been kind enough to read much of the manuscript and to express approval of the entire project.

W. LESLIE BARNETTE, JR.



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## CHAPTER I

### INTRODUCTION AND STATEMENT OF THE PROBLEM

THIS STUDY aims to ascertain the effectiveness of test pattern data for vocational and educational guidance purposes. The main emphases of this study are upon the following questions: Do pattern data obtained from judiciously selected test batteries differentiate adequately (a) between the successful and the unsuccessful individuals within a particular occupational area, (b) between these two groups and estimated population means, and (c) between diverse occupational areas themselves? Furthermore, (d) do the successful individuals test higher than the failures on presumably "critical" tests only?

Despite the vaunted utility of occupational ability patterns, especially for purposes of vocational guidance, little work has been done in this area since the depression years (9, 11, 29). Few actual patterns have been constructed, and most of these were made possible by large-scale counseling clinics which employed only a standard or uniform test battery. It is now approximately fifteen years since this pioneer work. Counseling and guidance practices have shifted from invariable test batteries in many agencies; both job and training demands have altered considerably, to say nothing of the labor market itself. It is time that a current attack on the problem be made, and a veteran group seemed the best and most practical sample with which to begin. This is not to neglect the work of the United States Employment Service (24, 28), whose data, however, are not based

on measured characteristics of workers.

In the present study interest has been focused on the characteristics of a large veteran sample, all members of which had experienced advisement and who, presumably, had been influenced by its results. All such veteran clients were "completed" cases who had gone through the entire advisement process and had selected a training goal which had been approved by the V.A. These veterans had been counseled at the Vocational Service Center of the New York City Y.M.C.A. (hereafter referred to as VSC), the sponsoring agency for this research.

In order to obtain significant occupational information, it was necessary to ascertain the current status, extent of progress, and satisfaction or dissatisfaction of these veteran clients. This involved securing information relative to the current status of both the service-connected disability group and the non-disabled group some two years after last seen.<sup>1</sup>

The first problem, then, was that of contacting by means of a suitable questionnaire a sample of this VSC-advised group. This involved a pretested mail questionnaire approach. From this base it was hoped that for each occupational objective to be studied, a Success (S) and a Failure (F) group would be secured and a useful test-pattern analysis conducted.

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<sup>1</sup> Problems in connection with this aspect of the follow-up are discussed in two papers by the present writer in the *Journal of Social Psychology*, 1950, 32, 129-156.



## CHAPTER II

### PILOT STUDY

THE RESULTS of the pilot study, primarily designed as a "test run" for the questionnaire itself, will only be summarized here.<sup>1</sup> In addition to this aim, it was important to learn how responsive a miscellaneous group of veterans would be to a printed questionnaire, and how many would be contactable by mail. Another aspect was whether as many replies might be obtained from those in skilled trades as in professional areas.

Around September 1, 1947, 292 questionnaires were mailed, along with a covering letter signed by the Director of Veterans' Advisement and a stamped, self-addressed envelope for reply. (None of these addressees was to be included in the main part of the study.) Of this sample, 20 were returned by the post office because of invalid addresses, reducing the working total to 272 individuals who presumably received the questionnaire. Of these 272, 204 belonged to the non-disabled veteran group (veterans covered by the provisions of Public Law 346), and 68 belonged to the disabled group (those under Public Law 16). This is approximately a 3:1 ratio in favor of the PL 346's, a ratio which was maintained throughout the main study. After a time lapse of one month, 138 replies had been received, or about 50 per cent of the working total. No follow-up

letters were sent to non-respondents.

The main research project was planned as a follow-up of VSC-counseled veterans throughout the entire range of occupations. Had it been found that sizeable returns were obtained only from the professional group, the purpose and value of this study would be considerably restricted. The present sample was classified by means of the occupational categories in the *Dictionary of Occupational Titles*: professional-managerial, sales and clerical, personal service, agriculture and forestry, skilled, semi-skilled. Despite the small size of some of those occupational groups, in practically every instance replies were received from 50 per cent of the addressees. It appeared, then, that a surprisingly high number of replies might be expected from persons in occupations (or in training towards such occupational goals) that might be described as nonverbal.

The original questionnaire needed few revisions. In general, alterations consisted in rewording questionnaire items in the interests of clarity; for example, making absolute the distinction between on-the-job training and a full-time job. A tentative scoring system was tried out with the respondent group in order to locate a success group and a failure group. The details of this scoring system, together with features of the questionnaire design, will be discussed in the following chapter.

<sup>1</sup> For a longer report of the returns from this preliminary study, see Barnette (3).

### CHAPTER III

## THE REVISED QUESTIONNAIRE AND THE APPLICATION OF THE Q-SCORE

THE FINAL form of the questionnaire contained twenty-three items relating to the specific occupational program of the veteran. No one individual was expected to give replies to all of these twenty-three items, since the questionnaire was designed to fit all cases (those in college training, in trade school, on-the-job training, full-time employment, etc.). The veteran was requested in the covering letter which accompanied the questionnaire to answer only those items that specifically pertained to his case.

It was also felt that the questionnaire should be limited to one page. Furthermore, it was not desirable to develop more than one type of questionnaire (i.e., one to be sent to the college population, another to the on-the-job group, etc.) since cases that had shifted programs would then be missed. The questionnaire was, however, designed so that an equal number of items applied to the on-the-job trainee and to the individual in some school program.

At the top of the questionnaire sheet were filled in the veteran's name, his occupational objective as indicated in the VSC files at the time of his last interview, and the date of this last interview. (A copy of the questionnaire will be found in the Appendix.)

### A. THE Q-SCORE

The scoring system applied to the questionnaire replies was intended to express the occupational "progress" ("adjustment," "status") of the veteran in terms of an arithmetical score. This is labeled the Questionnaire-score and referred to hereafter as the Q-score. The

typical unit of scoring employed was 2 (+ or -), but for some "intermediate" cases, -1 was also used. (There was no utilization of a +1 score.) A few examples will make the scoring system clear.

Score 2 points if the veteran began training (school or on the job) towards his original and approved objective; score 2 if he is still engaged in this program; if he is "very satisfied" or "moderately satisfied," score 2 more, but if dissatisfied, or if he checks, "not what I thought," -2; if indifferent, -1. A client engaged in all the "correct" activities in this connection could earn a maximum positive score of 6 points.

In the event the veteran had dropped the approved program prior to its completion, -2.

If he has a full-time job (and, consequently, did not start any schooling or on-the-job training), and if this job is identical or similar to the original objective, score 2 points; should this job be dissimilar to the objective, -2. In addition, if he likes the job he has, score 2; if indifferent to it, -1; if dissatisfied, -2.

Part-time school programs or part-time job programs are scored in a similar manner, and then the total number of points earned on such items is divided in half. Thus a veteran whose replies indicated that he began part-time attendance at some school, that he was still attending the school, and that he was satisfied with his program would earn a total of only 3 points.

Item 22 of the questionnaire specifically asks the veteran if he has changed his occupational goal since last seen at VSC. If the veteran says "no," score 2; if "yes," -2. Furthermore, in response to the next item ("If you have changed, what is your goal now?"), should the veteran write in "undecided," score an additional -2. No positive score (which would give credit towards pursuit of the now-abandoned original goal) is earned by the respondent if this space is filled in with some specific occupation different from the original objective.

In terms of the relevant replies to the questionnaire, a respondent could earn a maximum positive score of 18 or a maximum negative score of 12. This, then, is the theoretical range of the Q-scores. No persons hit these peaks. Only one indi-

vidual earned a score as high as +16; the highest negative score earned by any respondent in the main study was -11.<sup>1</sup>

The illustrative scoring suggests that all *Q*-scores have been calculated from the point of reference of the original objective. This is not quite true, since in a small proportion of cases (10 per cent of the total of 890 respondents in the main study) the veteran reports he is pursuing one of the alternative goals, also a result of advisement, and therefore also acceptable. Most of such shifts involve very slight program training changes; for example, a client with the originally approved goal of electrician reports he has shifted to that of refrigeration mechanic, one of the alternates discussed at the time of counseling.

#### B. SIZE OF THE FAILURE GROUP, PILOT STUDY

Of some interest is the proportion of failures that results from the scoring

<sup>1</sup>For illustrative cases and specific *Q*-score computations, the reader is referred to the author's original thesis, on file in the Library of New York University.

scheme described above. Utilizing zero as a cutoff point and turning to the respondents obtained from the pilot study, 49, or 47 per cent, of the PL 346 (non-disabled) cases earn scores of zero or below; of the PL 16's (disabled), 7, or 21 per cent, earn such negative scores. Thrown together, both groups produce a total of 56 failures, or 43 per cent of the whole respondent group from the pilot study.

There is, of course, a poorly-defined intermediate group having scores close to zero; such *Q*-scores indicate an almost even balance of "correct" and "incorrect" features. It seems unlikely that individuals with such scores should be considered successes as regards pursuit of an occupational goal. It is probably a more defensible procedure to establish two cutoff points, designating as successes all those earning a *Q*-score of +3 or better, and as failures all those with a *Q*-score of zero or below. The intermediate group is abandoned because of its ambivalence. This procedure was followed in the main study, with a resulting diminution in the size of the failure group.

## CHAPTER IV

### THE FOLLOW-UP GROUP

SINCE IT WAS impossible to conduct a follow-up study on the entire VSC veteran population (which, as of October 1, 1948, totaled more than 10,000), a selected group had to be composed. Furthermore, since interest was centered primarily on the usefulness of occupational test score patterns, it was important that an attempt be made to contact only veterans who had indicated occupational choices in fields for which there would be a sufficient number of cases for later analysis—provided, of course, that enough such persons could be reached by mail. It necessarily had to be a contact by mail, despite the successful experience of Brown (6, 7), in Philadelphia, with his telephone survey. A check of the VSC records showed very few telephone numbers for the selected group as a whole, and many of these were no longer correct.

It was also desirable to cover a wide range of occupations. What work had been done on occupational ability patterns involved mostly professional and clerical fields. (The work of Dvorak in Minnesota in 1935 is an exception.) The aim was to extend this range downward at least to the semi-skilled level. It was important, too, to utilize only veteran cases which were relatively "old"—i.e., those that had been through the counseling and testing procedures and, by the time of the follow-up, had had considerable time to pursue their chosen program. Consequently, no cases were selected for contact after February of 1947. This meant that by the time the veterans whose cases had been "closed" by this date received the questionnaire, they had presumably been at work on their

program for a little more than a year (thirteen months, to be exact). The oldest cases are those whose records were closed in the last few months of 1945.

It was furthermore desirable to include, as part of this follow-up, the cases receiving benefits under Public Law 346. As far as the writer is aware, this is the first time such an inclusion has been attempted on so large a scale.

With these considerations in mind, a check of the VSC files produced a list of those occupational groups which might profitably be studied. There were in each group a minimum of 50 cases. It was hoped that, with sufficient questionnaire returns, pattern data might be developed for all of the following groups:

Engineers	Auto repairmen
Chemists	Cabinetmakers
Physicians	Machinists
Lawyers	Tailors
Salesmen	Watchmakers
Junior executives	Commercial artists
Draftsmen	High school teachers
Retail store managers	Electricians
Accountants	Plumbers
Clerical workers	Radio repairmen

The files yielded a total of 1,375 cases. It was hoped that this population might be contacted on the first mailing.

#### A. FIRST RETURNS

On March 30, 1948, the VSC office mailed a total of 1,375 questionnaires together with a covering letter and a stamped, self-addressed envelope. Of these, 55 were returned by the post office because of addresses no longer valid. The working total was thus reduced to 1,320. By the end of June, 1948, a total of 580 replies had been received (or 44 per cent of the working total). Of these 580, 405 (70 per cent) represented PL 346 cases, and 175 (30 per cent) represented PL 16's. Although the hope had been for a larger return from the first mailing, a check of the relevant and recent literature (3, 6, 22) demonstrated that this was anything but a poor showing.



### B. SECOND RETURNS

Some three months after the first mailing, there thus remained 740 non-respondents. A second follow-up letter was composed, somewhat more urgent in tone, and sent to this group on June 21, 1948. Of this total sample of 740, the post office returned 21 because of inadequate addresses. By the fall of 1948, replies from 310 individuals, or 42 per cent of the working total, had been received. Of these 310, 215 (70 per cent) were PL 346 cases, while 95 (30 per cent) were PL 16's. The ratio of the number of non-disabled to disabled respondents was 3:1, as it was in returns from the first mailing. The response of 42 per cent from the second follow-up was gratifyingly higher than expected.

All together, then, a total of 890 veterans replied to the questionnaire; 409 failed to reply. A total of 76 failed to receive communications be-

cause of invalid addresses.

These 409 "no reply" individuals constitute a technical hazard of some magnitude, especially since they represent practically one-third of the original sample. Because it was felt that the matter could not be allowed to rest at this point, plans were made for a third contact. It did not seem advisable, however, to attempt a contact for all of this non-respondent group. A random sample of this group was therefore selected. Discussion of the returns from this third contact will be presented in chapter VI.



## CHAPTER V

### ANALYSIS OF QUESTIONNAIRE RETURNS

#### A. FIRST VERSUS SECOND WAVES

**T**HE PROBLEM that is of immediate interest is what similarities and/or differences may be detected between the first and second set of respondents. There is a total of 580 respondents from the first wave and 310 from the second; we ignore for the moment all potential differences between the disabled and non-disabled involved in each of these different sets of returns. Chi-square tests for significance were run on some forty comparisons in this connection. In the main the two sets of returns were remarkably similar—enough so that one may with impunity treat all of these respondents as being drawn from the same parent population.

#### B. VSC SAMPLE AS A WHOLE

The entire veteran sample here employed has the following characteristics. The sample is almost entirely male. The average age at time of advisement is 25.7 years; average education completed by this time, 12.6 grades. Single individuals comprise 75 per cent of the group; 52 per cent of all clients state they have no dependents. Distribution of occupational objectives is heavily weighted in the direction of professional and managerial groupings. Approximately 54 per cent are heading towards this combined level; 24 per cent towards clerical and sales objectives; 17 per cent towards skilled and semi-skilled occupations; 5 per cent, miscellaneous or none stated.

Occupationally this is, of course, not a random sample. It is, however, a sample typical of other veteran groups. Wilson (31), reporting on a sample of New Jersey

veterans involving 1,361 cases, finds 39 per cent of this group aiming for professional and semi-professional fields; Miller and Bracklin (22) report 41 per cent of the counseled veteran sample at Temple University were approved for objectives in the professional and managerial areas.

The group is by no means predominantly a college population. The follow-up results from the 890 respondents from the first two waves demonstrated that, approximately one and a half years after advisement (i.e., during 1948), some 45 per cent had continued with additional schooling—which might be anything from high school completion through post-graduate collegiate work—and that another 45 per cent were engaged in full-time jobs.

#### C. PUBLIC LAW 346 AND PUBLIC LAW 16 CASES

All studies that deal with large and representative veteran groups automatically have to cope with this distinction. The PL 346 group is usually described as the non-disabled. It typically consists of individuals who have no service-connected disabilities and of individuals whose applications for such disability benefits have been rejected by the V.A. This group is also the one whose members so frequently take advantage of the educational and vocational provisions of the "G.I. Bill of Rights," i.e., Public Law 346. The PL 16's are the V.A.-approved disabled group, their service-connected (i.e., service-incurred or else service-aggravated) disabilities ranging from outright psychotic conditions and 100 per cent physical disability to minor skeletal

or skin damage. Each such disability is given a rating—anywhere from 10 to 100 per cent—which conveniently expresses in terms of V.A. medical opinion the seriousness of the disability.

In terms of the present study the differences that are revealed when these two veteran groups are contrasted have been treated elsewhere.<sup>1</sup> Few significant dif-

ferences were found, so the distinction between disabled and non-disabled cases may be abandoned in the discussion of the occupational test pattern data with which this study is predominantly concerned.

<sup>1</sup> W. L. Barnette, Jr. Report of a follow-up of counseled veterans. I. Public Law 346 versus Public Law 16 clients. *Journal of Social Psychology*, 1950, 32, 143-156.

## CHAPTER VI

### A CHECK ON THE NON-RESPONDENTS

**A**FTER TWO attempts at contact by mail, the number of non-respondents totaled 409 (31 per cent). It seemed imperative to attempt at least an estimate of the characteristics of this non-respondent group. Since it was not practical to attempt a third contact of the entire group, a random sample was selected through the process of pulling every fifth name from an alphabetical file. By this means a total of 82 individuals was secured who, there was reason to believe, were representative of the entire group.

Since this was a random sample, it was essential that as nearly 100 per cent returns as possible be obtained. Persistent attempts were made to insure a 100 per cent reply by means of intervening post-card reminders, further letters, telephone calls where feasible, and, in some cases, personal calls at the home of the individual. In the end, returns were received from all but three persons in the sample.

The aim of this non-respondent check was to provide evidence on the reliability of the data at hand. The data for the third wave proved rather similar to the combined first two waves. There were no differences in terms of vital statistics or educational status. In terms of all psychometric data there was also identity. The mean *Q*-scores were different, however (at the 2 per cent level). The third wave

of returns produced a significantly lower mean *Q*-score; i.e., more failures were obtained from this random sample than from the combined first two waves.

The third wave also produced a significant difference in terms of the categories which describe the pursuit of the training objective. On the basis of this non-respondent check there were significantly more "never began's" and slightly more (but not significantly so) "drop's." The percentage for the "continue's" was, accordingly, lowered. None of these obtained differences approaches the 1 per cent level, however. On the basis of the non-respondent check, the "never began's" are a larger group than that from the first two waves (5 per cent level); the "continue's" are decreased (2 per cent level). No difference was evident in the case of the "complete's." The reader is cautioned that these revised figures actually represent a two and one-half year follow-up. It is therefore reasonable that, given a longer time lapse, some changes in these trends should appear.

Excellent agreement exists between the third versus the first two sets of returns as regards the occupational level represented by the training objective, both the third and first two being weighted towards the professional-managerial end of the occupational scale.

# CHAPTER VII

## THE "SUCCESS" VERSUS "FAILURE" GROUPS

THE QUESTIONNAIRE SCORE (Q-score) was employed to arrive at a measure of occupational progress which would reflect all the respondent's replies to questionnaire items. The establishment of cut-off points to separate the successes from failures was necessarily arbitrary. There was no outside criterion of success against which such a scale could be validated, since the majority of respondents had not completed training and so were not yet engaged in full-time jobs whereby a reliable criterion could have been established. (To wait for such would have entailed too great a delay, and many cases now available would have been lost.) High Q-scores are thus only a rough statistical index of whether the veteran has pursued with satisfaction and with some signs of success for a period of approximately two years the program originally agreed upon. Low Q-scores, of course, indicate the reverse.

There is an intermediate group of respondents in which the positive and negative aspects of goal pursuit are about evenly balanced, so that it is difficult to describe these either as successes or failures. These "Intermediates" are defined to include respondents earning a Q-score of +1 and +2. It was felt that this was

a justifiable procedure since, in so doing, only a small group of respondents was eliminated (5 per cent; see Table 1) and, more importantly, contamination of the successes and failures with such middle-of-the-road cases was prevented.

Thus, by delimiting successes as those respondents earning a Q-score of +3 or better, failures as those with Q-scores of zero or below, and Intermediates as those with Q-scores of +1 and +2, the breakdown as shown in Table 1 results.

By establishing the cut-off points for success and failure at +3 and 0 respectively, maximum efficiency of segregation is obtained: thus, no individuals are characterized as Successes, who never began the approved training, and 98 per cent of the Failure group is described as "never began's"; only 3 per cent of the "complete's" are classified as Failures and 95 per cent as Successes. Inspection of Table 1 will show this segregation is also achieved with the "drop's" and the "continue's," but not quite as sharply.

The mean Q-score of the Successes is 8.2, with a standard deviation of 2.39; that for the Failures, -4.2, with a standard deviation of 2.52. A glance at the data in graphic form (not here reproduced) shows the distribution of Q-scores

TABLE 1  
SUCCESS VERSUS FAILURE IN TERMS OF CATEGORIES AND Q-SCORES  
(ALL RESPONDENTS FROM FIRST AND SECOND WAVES)

	Never Began		Drop's		Continue's		Complete's		All		Mean Q-Score
	N	%	N	%	N	%	N	%	N	%	
Success (+3 and up)	0	0	17	18	482	92	75	96	574	66	8.2 ± 2.39
Intermediate (+1, +2)	3	2	16	18	15	3	1	1	35	5	
Failure (0 and down)	165	98	59	64	27	5	2	3	253	29	-4.2 ± 2.52
Totals	168	100	92	100	524	100	78	100	862	100	



for the total group to be markedly skewed to the left, significantly (considerably beyond the 1 per cent level) more scores piling up at the high end of the scale. This skewness means only that the numerical size of the Success group is approximately twice that of the Failure group. The utilization of the two cut-off points by which these groups are demarcated, however, makes for a sharp distinc-

and educational status. Table 2 presents these data.

Of the five obtained differences in Table 2, four may be said to be statistically significant. The Success group is superior in manual dexterity, as measured by the Purdue Pegboard, at the 5 per cent level; it is also superior (1 per cent level) in clerical aptitude, as measured by the Psychological Corporation's

TABLE 2  
MEAN T-SCORES, SELECTED PSYCHOLOGICAL TESTS, AGE AND EDUCATIONAL STATUS,  
SUCCESS VERSUS FAILURE GROUPS  
(COMBINED FIRST TWO WAVES)

	Successes			$D/\sigma_{diff}$	Failures		
	Mean	$\sigma$	N		Mean	$\sigma$	N
ACE	56.70	8.76	342	1.05	55.62	9.36	104
Pegbd.	53.78	7.36	262	2.10	52.22	7.32	148
Cler.	51.22	9.84	337	3.60	47.50	10.60	148
Age (yrs.)	25.08	4.26	574	4.10	26.60	5.04	253
Educ. grade	12.80	1.60	574	6.30	12.08	1.53	253

tion between them. There is a small overlap which amounts to 5.5 per cent.

The returns from the third wave (the non-respondent check) altered in no important way the mean *Q*-score values. These returns did produce, however, a numerically larger Failure group. It must be remembered here that a longer time lapse is involved. If the obtained data for this third wave are taken as representative of the entire VSC sample, then the best estimate of the proportionate size of the Success versus Failure groups for the whole sample is 61 per cent Successes and 37 per cent Failures, with 2 per cent Intermediates. The *Q*-score distribution still remains markedly skewed.

It is also of interest that the Successes and Failures are to some extent distinguished as groups in terms of mean scores on the three most frequently administered tests, as well as in terms of age

General Clerical Aptitude Test. In regard to the ACE (1944 edition), there is a trend in the same direction; it does not, however, approach any of the accepted tests for statistical significance.<sup>1</sup> The Success group is reliably younger and has achieved higher educational status at the time advisement was initiated.

The Failure group is in several respects similar to Friend and Haggard's "low achievers"—a group of 20 cases, extensively counseled, located by means of ratings which significantly differentiated them from 20 "high achievers" (12, p. 74). The VSC data are not of the type in which family background factors could

<sup>1</sup> The population administered the ACE is, however, a more selected group than that typically given the other two tests. Both Success and Failure groups are reliably above the expected mean *T*-score of 50 on the ACE.



be frequently noted. A check of the many significant differences between these high and low achievers<sup>2</sup> shows some seven items that might be said to be characteristic of VSC Failures:

- Little relevant activity subsequent to counseling.
- Notation of a change in job status or vocational orientation for the worse.
- Ambivalence towards jobs or vocations or earning a living.
- Poor mental health or emotional instability.
- Few parallels among interests, aptitudes, training.
- Job dissatisfaction.

<sup>2</sup> All items from the bar diagrams with a *P* value of .05 or less (12, pp. 80-87).

Lack of stability or of continuity of employment for the approved type of work.

Conversely, the high adjustment group in this same study by Friend and Haggard are in some respects similar to the VSC Success group: both groups had had more formal schooling and were notably less negative to test interpretation and to counseling; they also exhibited fewer signs of dependency (12, p. 56, p. 51). It is of interest that the study of Friend and Haggard, and the present one, though approaching the problem of vocational success and failure by divergent techniques, produce as much corroborative data as they do.

## CHAPTER VIII

### THE PRESENT STUDY:

#### A STUDY OF OCCUPATIONAL APTITUDE PATTERNS

IT is infrequent now for any counseling agency to have contacts with experienced adult workers. The bulk of all vocational counseling problems concerns a "threshold worker" group, i.e., individuals with the problem of choosing an occupational career, or, frequently, individuals seeking confirmation of tentative plans. It is this group that is in need of the most help and whose problems of occupational adjustment seem most pressing. This study was frankly undertaken with this type of spotlight. Since, however, all previous research with occupational *ability* patterns has dealt with experienced and successful adult workers for whom measured characteristics were available, it seemed advisable to distinguish the research here reported from that based on groups checked against an outside criterion.

Occupational *aptitude* pattern is here used to denote the measured characteristics of individuals who, after completion of advisement whereby a primary occupational objective was agreed upon, and, after a period of some two years, were successfully continuing with their occupational plan. The patterns here presented are the measured characteristics of *successful beginners* in the specific occupational categories. There are reasons to presume these are stable patterns; confirmation of this point will be advanced, where possible, when the specific profiles are discussed.

Table 3 presents the numerical size of the *S* and *F* groups for the various occupational aptitude patterns to be discussed in this monograph. Respondents

from the non-respondent check have been included here.

With data groups of this type—*S* versus *F*—it may occur to the reader that the situation is ideal for biserial correlation. However, the *S-F* scale obtained from the *Q*-scores (dichotomized in order to

TABLE 3  
NUMERICAL SIZE OF SUCCESS, FAILURE, AND  
INTERMEDIATE GROUPS OBTAINED ON THE BASIS  
OF FINAL RESPONDENT TOTALS

	<i>S</i>	<i>F</i>	Mids
Engineers	103	45	7
Clerical workers	54	40	7
Accountants	74	24	5
Salesmen	77	56	3

calculate biserials) has been shown not to be normally distributed; accordingly, the entire biserial technique, superficially so attractive in a situation of this type, has been eschewed.

#### A. TESTS USED, NORM GROUPS, SCORE TREATMENT

The Vocational Service Center does not employ a standard test battery which is administered to all clients. The particular tests that a client is requested to take are the result of what the counselor feels, after the initial interviews, will be the most appropriate. Certain tests may also be included for a particular client for exploratory purposes. Consequently, any one client's summary record may contain data for only one or two tests, whereas another's may reveal an extensive battery. The tests administered by VSC are, however, those that are widely used.

Test profiles should avoid the dilemma of a shifting base. As Harmon (15, pp. 208-209) has pointed out, the pattern that emerges under the conditions of a non-stable base will be an artifact of the varying norm groups. For this reason, local norms—all based on unselected groups of veterans numbering 400 or more—have been used in this study for the following frequently administered tests:

- Kuder Preference Record, Form B ( $N$  for local norm group = 780)
- Psychological Corporation's General Clerical Aptitude Test ( $N = 400$ )
- Purdue Pegboard ( $N = 200$ ; see below)
- Engineering and Physical Science Aptitude Test ( $N = 450$ )

All individual scores have been converted into  $T$ -scores, merely for the sake of easy comparison.

In regard to the Kuder, these local norms for the nine scales of Form B will be found in Hanna and Barnette (14).

The local norms for the Pegboard (average score for three trials) were so nearly identical to the published revisions by Long and Hill (21) that interpolations were not made.

For the Clerical Aptitude and the Engineering and Physical Science Aptitude local norms, communicate with the present author or with the Vocational Service Center, 40 East Fortieth Street, New York City 16.

The one test for which, by design, local norms were not employed was the ACE. Since the population administered this test was to be compared only with a college group, but a select group in terms of the population at large, it seemed desirable to use the published norms (26, Table 3, p. 12) for this test, since they are based on such a large  $N$ .

In the interests of consistency this has also been done with the Thurstone Mental Alertness Test (adapted from the ACE high school form), the norms for the twelfth grade (27, Table VI, p. 11) being used. When it came to the construction of patterns for the more professional groups, there would occasionally be found a few of these Mental Alertness scores in the midst of many ACE (college) scores. Such Mental Alertness (TMA) scores have, accordingly, been converted into ACE equivalents by means of the formulae provided by Thurstone and Thurstone (27, p. 6). Where this has been done, a note to this effect is appended on the appropriate tables.

Other tests utilized in some of the forthcoming occupational aptitude patterns for which local norms were not available and for which published norms were employed, are given below. Despite the fact that this means, technically, a departure from a stable comparison base, the writer feels that these cases—dictated by necessity—do not represent a great inadequacy. Practically all of the following tests supply norm data based on large groups of males for the age range and educational status (twelfth grade) that is typical of the VSC sample. Furthermore, most of the tests below are featured only occasionally in the profiles.

The tests for which published norm data are used and the particular norm groups upon which  $T$ -scores are based, are the following:

Bennett-Fry Test of Mechanical Comprehension, Form BB. Norm group used was that of engineering school freshmen,  $N = 2,460$ , as given in the manual (4). This norm group was the nearest to a high school graduate population that was available.

Likert and Quasha's Revised Minnesota Paper Form Board. Norm group used was that of high school graduates,  $N = 209$ , as in the manual (19). The base for this particular test was kept constant throughout. The engineering group was not, in other words, assigned  $T$ -scores in terms of engineering freshman norm data as cited in the manual. With such special groups, however, correspondence to such norms will be treated in the text.

Iowa Chemistry and Mathematics Aptitude Examinations, Form M. The published norm groups ( $N = 369$  and  $N = 858$ , respectively) were used as in the manual (32, pp. 21-23).

Lee-Clark Fundamentals Survey Test (fundamental skills in arithmetic for high school students). Published norms as given in the manual (33) for over four thousand subjects.

Allport Ascendancy-Submission Scale. Published norms (deciles), as in the manual, for 2,578 men (1, p. 13). The midpoint of each decile was taken, and these in turn were converted into corresponding  $T$ -scores.

Otis Quick-Scoring Mental Ability (Gamma) Test.  $T$ -scores computed from a table of percentile ranks of total scores based on a sigma of 16 points.<sup>1</sup>

### B. PROFILE SIMILARITY-DISSIMILARITY

The problem of profile similarity-dissimilarity is the conventional one of reliability. If the concept of the occupational aptitude pattern is at all sound, the following conditions should hold.

1. Patterns on individuals in similar occupations should show similarity.
2. Conversely, patterns on individuals engaged in dissimilar occupations should exhibit significant differences.
3. Patterns obtained on two equivalent groups of individuals within the same occupation should be highly similar; ideally, identical.
4. Patterns derived from Success and Failure groups within the same occupational area should be distinct.

It is surprising how frequently these assumptions are tested by intuitive means only, i.e., by inspection. What is needed is a statistical technique, not too cumbersome for practical utility, by which one can compare two obtained profiles for their similarity-dissimilarity. DuMas (10) has reviewed the relevant techniques and proposed, for exactly this purpose, what he has termed "the coefficient of profile similarity,  $r_{ps}$ ." This is a number which indicates the similarity or dissimilarity of one profile to another in terms of the slope of the corresponding segments of these profiles. In simpler terms, this measure accounts only for same or different line-slopes ignoring the magnitude of the differences on any one particular test for the two groups compared. Two profiles whose segment slopes are all in the same directions produce an  $r_{ps}$  of  $+1.00$ . Interpretation of  $r_{ps}$  is somewhat arbitrary; the following meaningful descriptions have been suggested by the author:

$r_{ps} = +.75$ to $+1.00$	very high similarity
$+.50$ to $+.74$	high similarity
$+.25$ to $+.49$	moderate similarity
$0$ to $+.24$	low similarity
negative	very low similarity

This is not a precision technique; its virtue is that by this means a quick measure is obtained without resort to elaborate statistical procedures.

<sup>1</sup> The table was supplied through the courtesy of the publishers (personal communication from Miss Helen M. O'Neill of the Division of Research and Test Service, World Book Company).

As a supplement to the above  $r_{ps}$ , the rank-difference correlation,  $\rho$ , between the mean scores represented by the obtained profiles, has also been calculated. As an index of dissimilarity,  $\rho$  should not be significantly different from zero.

In addition to these, absolute score magnitudes ("horizontal" significant differences via  $D/\sigma_{diff}$  or  $t$ ) must be taken into account—something which neither  $r_{ps}$  nor  $\rho$  does.

Two further measures of consistency have been employed where possible. One of these is what might be designated as a type of split-half reliability. Where the occupational groups were of sufficient size, the  $S$  and  $F$  groups were divided into two groups of equal size. A stack of cards representing data for 103 engineers of the  $S$  group, e.g., was divided into two groups by placing every other card into Group  $A$ , the remainder comprising Group  $B$ . A profile based on mean test scores was then constructed for both these groups; the two obtained profiles were then compared for similarity by means of  $r_{ps}$  and  $\rho$ . The conventional reliability standards were then applied.

The second of these measures of consistency is of a more "external" type and approaches the concept of validity. Where relevant data were available, the results from the occupational aptitude patterns here obtained were checked against other research previously reported. For example, Dvorak and others have published occupational ability patterns for men general clerical workers. Despite the fact that different specific tests were employed, certain of these profile characteristics ought to agree with similar features contained in the present occupational aptitude patterns.

All of the above techniques, with the exception of the last mentioned, deal with profile similarity as a whole. Mean score differences on individual tests need also to be checked for statistical significance. This has been done. Both large-sample and small-sample statistical techniques have been used, as demanded by the data at hand.

\* \* \*

The attention of the reader is now directed to the profiles themselves. That for the engineers, the largest group, will be presented first, illustrating the application of all of these statistical devices.



## CHAPTER IX

### ENGINEERS

THE LARGEST occupational group has been selected for presentation first. The size of the group allows for several statistical treatments and comparisons, some or all of which will be utilized with subsequent groups. All such methodology will here be reported in some detail—from the types of data specifically presented in tables and figures, along with the manner of integrating such discrete data, to the employment of certain summarizing statistical techniques.

The follow-up produced a total of 103 Successes and 45 Failures. All *S* and *F* engineers have been handled as two contrasted groups since the size of the specialty engineering areas is too small for special treatment. Both *S* and *F* engineer groups are largely composed of individuals with goals of electrical, mechanical, and civil engineering. The *S* group as a whole is predominantly composed of individuals still engaged in full-time professional schooling. Of the 103 *S*s, 83 (81 per cent) are to be found here.

#### A. TEST DATA UTILIZED

Of the wide variety of psychological tests administered to these VSC clients, mean scores on the following could usefully be computed:

- Kuder Preference Record
- ACE (1944)
- Iowa Mathematics Aptitude Examination
- Iowa Chemistry Aptitude Examination
- Engineering and Physical Science Aptitude Test
- Minnesota Paper Form Board
- Bennett-Fry Test of Mechanical Comprehension
- Purdue Pegboard: total scores, both hands, and assembly score
- Psychological Corporation's General Clerical Aptitude Test
- Allport Ascendance-Submission Scale

Table 4 presents in summary form the mean *T*-scores in terms of the norm groups previously indicated, together with the *N* and the obtained standard deviations for each of these scores. The table indicates (a) the levels of confidence at which the obtained mean scores for the *S* and *F* groups are significantly different from each other, and (b) whether these obtained *S* and *F* means are significantly different from the estimated population mean (i.e., *T*-score = 50). The center column provides the information indicated in (a)—the levels of confidence at which *S* and *F* means may be said to be significantly different from each other. The two extreme left and right columns present the levels of confidence at which the obtained means for *S* and *F* groups are significantly different from a *T*-score of 50.

#### B. *S* VERSUS *F* ENGINEERS

It will be seen that eight of the psychometrics differentiate the *S* and *F* groups. In six of these eight instances the *F* group earns a lower mean score than the *S* group. The *S* group is significantly superior to the *F*s on the computational, scientific, and clerical Kuder scales; they are significantly lower than the *F*s on the persuasive scale. Other significant differences between *S* and *F* groups are evidenced on the Iowa Chemistry, the Engineering and Physical Science Aptitude, the Paper Form Board, and the A-S Scale.

Special mention should be made of the mean scores cited for the Paper Form Board. The base from which these scores were calculated was that of high school graduates. From a counseling point of view, interest would be focused on how an engineering applicant rated in terms of engineer-



TABLE 4  
PSYCHOMETRIC DATA FOR ENGINEERS, *S* VERSUS *F*, WITH SIGNIFICANCE RATIOS\*

	Success				<i>S</i> vs. <i>F</i> Level of Signif.	Failure			
	Level of Signif. from 50	Mean <i>T</i> -Score	$\sigma$	<i>N</i>		Mean <i>T</i> -Score	$\sigma$	<i>N</i>	Level of Signif. from 50
Kuder:									
Mech.	1%	55.4	6.4	83	—	56.9	9.2	39	1%
Comp.	1%	60.3	7.6	83	1%	47.5	7.4	39	—
Sci.	1%	60.5	7.1	83	1%	56.3	7.6	39	1%
Pers.	1%	43.9	9.3	83	1%	48.4	8.6	39	—
Art.	—	51.9	7.9	83	—	53.6	6.4	39	2%
Lit.	—	48.7	7.4	83	—	47.8	9.7	39	—
Mus.	1%	45.8	8.5	83	—	47.5	10.4	39	—
SS	1%	43.3	9.8	83	—	46.3	9.0	39	—
Cler.	—	48.5	8.7	83	1%	43.3	8.7	39	1%
ACE:†									
Total	1%	60.8	9.5	95	—	59.8	8.7	40	1%
"Q"	1%	60.7	8.7	95	—	59.4	6.9	40	1%
"L"	1%	59.1	9.2	95	—	57.9	9.6	40	1%
Iowa:									
Math.	1%	62.1	8.4	27	—	58.8	6.2	9	5%
Chem.	1%	65.3	7.9	21	>5%	59.5	8.3	10	5%
Engin. PS	1%	58.1	9.4	100	1%	51.5	8.7	40	—
PFB	1%	58.1	12.1	80	5%	53.4	9.2	33	—
Bennett Mch.	1%	54.9	10.5	31	—	55.6	9.5	15	1%
Pegbd.:									
Total	—	53.4	7.4	41	—	54.8	7.0	19	—
Ass.	1%	55.3	7.7	41	—	57.3	4.5	19	1%
Clerical:									
Total	5%	54.9	7.4	33	—	58.0	6.3	15	1%
Sp.-Acc.	—	53.6	8.2	33	—	55.1	6.2	15	5%
Numb.	1%	58.0	6.8	33	—	57.8	5.4	15	1%
Verb.	—	52.2	8.0	33	—	54.6	6.5	15	5%
A-S Scale	—	49.9	8.6	32	5%	55.9	9.2	17	—

\* To test for confidence levels where any *N* in the above table is less than 30, *t* was calculated; otherwise, *D*/*sd* diff.

† For *S* group only: 4 TMA's converted to ACE equivalents.

ing school freshmen. A check against the published norms for this test shows that, at least in this score range, the performance of the typical high school graduate and the typical engineering school freshman is identical.

#### C. ENGINEERS VERSUS POPULATION MEANS

Practically all of the 24 scores indicated in Table 4 show the engineering group to be significantly different from the estimated mean of the population (*T*-score = 50). The group seems clearly demarcated in this respect, as an inspection of the confidence levels presented in the two extreme columns of Table 4 will show. There is a total of 11 measures

where both *S* and *F* groups are significantly different from a mean of 50. It is not always a case of the *S*s earning a higher mean.

#### D. ENGINEER OCCUPATIONAL APTITUDE PATTERNS

All of these data are presented in graphic form in Figures 1 and 2. These figures duplicate a large share of the data presented in Table 4, but in different terms:

*S* versus *F* profiles are indicated by solid and broken lines respectively;

Tests which significantly differentiate *S* from

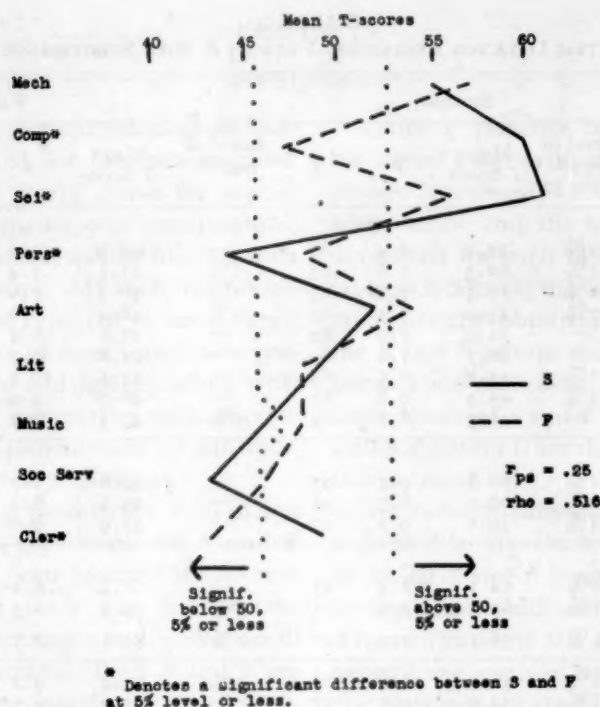


FIG. 1. Engineer Occupational Aptitude Patterns, Kuder Scales, S vs. F.

F are indicated by an asterisk following the test title;

Broken vertical lines indicate the boundaries, above and below which obtained means are significantly different from the assumed one of 50 at the 5 per cent level or less.<sup>1</sup>

All mean T-scores have been rounded to the nearest whole number.

Figure 1 presents the mean scores for the nine Kuder scales for the S and F engineering groups. Figure 2 summarizes the data in similar fashion for the tests other than the Kuder. In this latter

<sup>1</sup> Any mean score on the profiles plotted within these two vertical boundary lines is not significantly different from a T-score of 50 (in the sense that the 5 per cent criterion is not met). In practice this meant the calculation of significance ratios between each obtained mean and the assumed mean of 50. In computing the standard error of this latter mean, N was made identical to the N upon which the obtained mean was found. The two vertical boundary lines are not, then, shown as equidistant from 50 because (Figure 1) the N for the S group is 83; N for the Fs is 39.

figure, T-scores for the subsections of the ACE and the clerical aptitude tests are graphed; total scores for these tests are omitted.

The coefficient of profile similarity for the S versus F group profiles in terms of the nine Kuder scales (Figure 1) is only .25, indicating merely some slight similarity.  $\rho$  confirms this with the value of .516 (which is not significantly different from zero). The S group tends to be more variable than does the F, as may be seen from the larger number of extreme scores which characterize the S group. The Ss earn more means that are significantly different from the population than do the Fs, in some cases this obtained difference being very large.

In regard to the other aptitude tests, as in Figure 2, the same trends are noticeable. The coefficient of profile similarity

indicates moderate, but not high, similarity;  $\rho$  confirms this estimate (.59, a value which is significantly different from zero only at the 5 per cent level). On the critical tests (those which differentiate  $S$  from  $F$ ), the  $S$ s are reliably superior; on several of the other tests, less discriminating, the means for the  $S$  group fall below those for the  $F$ s. The  $F$  group, on the other hand, not only tends to score below the  $S$  means on all important measures, but they are also "more erratic," i.e., they excel on certain tests unessential to engineering success.

The profiles presented in these two figures offer certain internal checks. It is of interest that the  $F$  group scores higher

on the Kuder persuasive scale than do the  $S$ s; the  $F$ s do likewise on the A-S Scale. Conversely, the  $F$  group scores lower on the Kuder computational scale and on the numerical part of the clerical aptitude test.

#### E. INTER-TEST DIFFERENCES

The attention of the reader has to this point largely been directed to what are here termed the significant "horizontal" score differences—differences on one particular test in terms of  $S$  versus  $F$  population means. Important score relationships exist on more than this one dimension. Attention needs to be given to what significant "vertical" score differences are

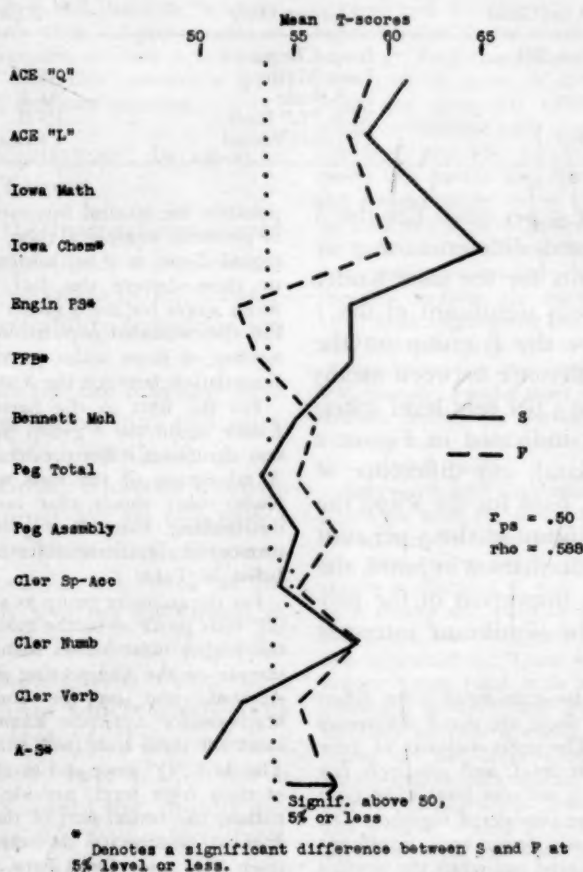


FIG. 2. Engineer Occupational Aptitude Patterns,  $S$  vs.  $F$ .

evidenced, as such differences provide an important measure of a test's utility in any battery. In practice this has meant the calculation of significance ratios and/or *t*-tests between all possible combinations, for the *S* as well as the *F* group. Charts were prepared (not reproduced), both for the *S* and *F* groups, to show the levels of confidence at which all inter-test differences were statistically significant. From these it could be seen what the minimum *T*-score difference was, needed to produce a level of con-

siderably less than that for the *Ss*. For the engineering group as a whole, the calculations show that the mechanical, artistic, and scientific Kuder scales supply excellent discrimination because of their score positions—the high score for the scientific scale, the medium score for the mechanical, and the average score for the artistic scale. It is to be noted that these are not necessarily the scales which provide good differentiation in terms of the *S* versus *F* groups. Of these three, only the scientific scale does that. These three scales, however, are the most diagnostic ones in terms of the Kuder inter-scale relationships both in the *S* and *F* groups.

Viewing the matter from the opposite direction, the calculations show that the least useful Kuder scales are those for social service and,

TABLE 5  
MOST DISCRIMINATING TESTS, AS JUDGED BY INTER-SCORE SIGNIFICANT DIFFERENCES FOR ENGINEERS

<i>S</i> and <i>F</i> Groups Combined	<i>S</i> Group Only	<i>F</i> Group Only
Engineer. Phys. Sci. Iowa Chem. ACE "Q" score Iowa Math. Clerical: Verbal	Iowa Chem. Iowa Math. A-S Scale ACE "L" score Clerical: Verbal	Engineer. Phys. Sci. ACE "Q" score ACE total PFB Clerical: Verbal

fidence of 1, 2, or 5 per cent. For the *S* group, any obtained difference of 3 or more *T*-score points for the nine Kuder scales (Figure 1) was significant at the 1 per cent level; for the *F* group on the Kuder scales, a difference between means of 4 points met the 5 per cent level criterion. For the tests indicated in Figure 2 (the non-Kuder data), any difference of 3.5 *T*-score points, both for the *S* and the *F* group, was significant at the 5 per cent level. With this information at hand, the reader can tell by inspection of the profile itself where the significant inter-test differences exist.

In terms of the inter-scale mean score differences on the Kuder, there are many differences that are significant. The great majority of these are at the 1 per cent level, and relatively few are at either the 2 or 5 per cent level when both the *S* and *F* groups are considered together. The *F* group provides many fewer such significant differences; as was pointed out when the profiles were discussed, the score range of the *Fs* is con-

possibly, for musical interests. In the counseling of potential engineers, then, these might be disregarded—or, at least, minimum attention paid to them—despite the fact that the obtained mean scores for the *S* group are significantly below the estimated population mean. In addition, neither of these scales provides significant differentiation between the *S* and *F* groups.

For the tests in the battery other than the Kuder, again the *S* group provided more inter-test significant differences than did the *F* group. A tabulation of the rank order of these non-Kuder tests shows that certain measures are outstanding, since they provide such a large number of significant differences. These tests are listed in Table 5.

For the engineer group as a whole, the "technical" tests prove to be the most useful. In general, the higher mean scores earned by the engineer sample on the Engineering and Physical Science Aptitude and on the Iowa Chemistry and Mathematics Aptitude Examinations distinctly mark off these tests from others in the battery. The ACE "Q" score and total score, also because of their high level, provide excellent discrimination; the verbal part of the Clerical Aptitude does so because of its very "moderate" score level. The role played here by the Engineering and Physical Science Aptitude Test is a differ-



ent one, depending upon whether the frame of reference is the *S* or the *F* group. In the case of the former, the high score makes this test a discriminating one; in the case of the latter, it is the undistinguished average score.

Considering only the *S* group, these same trends are detectable. Here, however, the A-S Scale shows up as an additional discriminating measure—about the only strictly average score found for the entire *S* group.

With the *F*s the same tests, in general, are shown to be "best," with the deletion of the two Iowa technical tests and the A-S Scale. The *F*s tend to earn lower mean scores on the former, but this difference is not a reliable one; in terms of the latter, the "high" ascendance score distinguishes the group. One new facet is added here: undistinguished performance on the Paper Form Board.

The Purdue Pegboard, because of its small discriminating function, might well be discarded. The same applies to the Clerical Aptitude Test as a whole. The Bennett-Fry Test of Mechanical Comprehension fails to discriminate as well as one might expect; it is still, however, a useful test for such a battery since the performance of the engineering group as a whole is significantly above average. As such, this provides a good check in terms of a guidance situation.

#### F. PATTERN CONSISTENCY: INTERNAL CHECKS

To check on the internal consistency of the obtained profiles for both the *S* and *F* groups, a variation of the conventional split-half reliability technique was employed.

The data cards for the *S* group were shuffled and then sorted into two piles. This gave an *N* of 52 for Group *A* and an *N* of 51 for Group *B*. Mean *T*-scores were then computed for all tests listed in the profiles. Similarly, the *F* group was so split as to provide an *N* of 22 for Group *A* and an *N* of 23 for Group *B*.

Inspection of the two pairs of profiles (not here reproduced) shows considerable similarity—similarity which is especially high in the case of the *S*s. The coefficient of profile similarity here is .56;  $\rho$  is .94, which well meets the usually demanded criterion for split-half reliability. With the *F* group, these statistics are

not as reassuring, but they cannot be said to be at variance with the picture presented by the *S*s. With this split-*F* group,  $r_{ps}$  is .22 and  $\rho$  is .83. The largest contributing factor here is the relatively small *N* for the entire *F* group and, concomitantly, the greater variability on so many of the tests employed. Regardless, the split-*F* groups show a good degree of pattern similarity. The obtained profiles for the entire *S* and *F* engineering groups may be said to fulfill the requirements for reliability in this sense.

#### G. EXTERNAL CONSISTENCY CHECKS

There are two recently reported studies dealing with engineer groups against which these data may be checked.

Perry and Shuttleworth (23, Table I, p. 365) report median Kuder scores for the entire February, 1947, Freshman Class of the City College of New York in terms of their degree objectives. From this group the Kuder scores for 242 engineering students have been abstracted and then converted into VSC *T*-scores. A comparison between this profile and that for the *S* group of the present study shows high similarity:  $r_{ps}$  is .75 and  $\rho$  is .95 (significant at less than the 1 per cent level). This excellent agreement may be more easily understood when it is realized that the two samples are similar in many respects other than engineering interest: the City College data represent, largely, a counseled veteran group of approximately the same age as that of the VSC sample. Furthermore, the City College follow-up studies (8, 20) on selected groups of veterans have demonstrated many likenesses to the present study.

Bolanovich and Goodman present mean Kuder scores for most ( $N = 16$ ) and least ( $N = 13$ ) successful women electronics engineering trainees who took a ten-month course at Purdue University (5, Table 3, p. 322). The course dealt with both theory and practice and was sponsored by RCA; the survivors were then to be hired by this organization. "Least successful" is hardly a failure group, and it is also a specialized engineering group. Since, however, the measured interests of this scientific type of engineering group do not differ radically from other scientific engineering specialties (25), it is instructive to compare these "most" and "least" against the present *S* and *F* groups. The expectation would be that the VSC *S*s would be similar to the most successful trainees; that the VSC *F*s



would show somewhat similar patterning to that of the least successful, but at score levels somewhat lower.

The profiles bear out these expectations. Good similarity between the two *S* patterns is seen ( $r_{ps} = .50$ ;  $\rho = .84$ , significant at the 2 per cent level). Slope directions and relative score position here show excellent agreement. In terms of the two *F* groups, the relationships are less distinct; slope directions show good agreement ( $r_{ps} = .50$ ) but relative score levels do not ( $\rho = .38$ , not significant even at the 10 per cent level). On five of the nine Kuder scales, the VSC *F* group earns lower mean scores than do the least successful trainees. All of the subjects of Bolanovich and Goodman show unusually low persuasive interest scores, undoubtedly accountable to the sex difference here; the group was composed entirely of women trainees.

#### H. VALIDITY CHECKS

The term "validity" is here used advisedly and with reservation. There is no strict criterion of success against which to validate the VSC patterns. There is, however, one reported study on engineers by Dodge (9) which provides data checked against a criterion of occupational achievement.

Dodge has published an occupational ability pattern based on 47 engineers, extracted from the files of the Adjustment Service. This is the only published pattern for engineers that is reported in the literature. The tests are in no way identical to those in the VSC battery, but the three notable characteristics which Dodge reported for this group, check on all counts with VSC data. Dodge reported his engineers were significantly above the population average in intelligence but not significantly above this average for either clerical aptitude or dominance. The *S* group may be said to agree in all these respects: its ACE score is well above the population average; on only one section (numerical) of the Clerical Aptitude Test is its score significantly above average; and on the A-S Scale its score is exactly at the estimated population mean.

It is of interest to note that the *F* group here is atypical both as regards Dodge's findings and the present *S* group in terms of the clerical and dominance scores. The *F*s score significantly higher than the population mean on all three sections of the Clerical Aptitude Test; they are also significantly more dominant. As a group they are, then, quite unlike the engineering *S*s.

The VSC engineering data, then, agree in all respects with outside available data which have been checked for validity against an outside criterion. Accordingly, it is felt that the profiles presented in this chapter possess validity in at least these specified respects.

#### I. SUMMARY

On the basis of the 103 Successes (*S* group) and 45 Failures (*F*s), the following summary statements may be made regarding the engineer occupational aptitude patterns presented in this chapter.

1. The *S* group is characterized by high computational and scientific interests and average clerical interest; it has high chemistry aptitude and high scores on the Engineering and Physical Science Aptitude Test as well as on the Paper Form Board. The *S*s are at the mean of the population on the A-S Scale. All of these eight differences significantly discriminate the *S*s from the *F*s.

2. The *S* group is significantly above the estimated population mean in mechanical interest, intelligence, and Bennett Mechanical Comprehension. The group is significantly below the population mean on persuasive, musical, and social service interests. It is approximately at the population mean on the Pegboard, the Clerical Aptitude Test, and Kuder artistic and literary interests.

3. From the point of view of inter-score significant differences, the pattern for the *S* group may be summarized thus:

For the Kuder scales:

- a) Highest scores for computation and scientific interests.
- b) Significantly lower (but still high) mechanical interest.
- c) Undistinguished (i.e., around the mean) scores for clerical, artistic, literary, and, possibly, musical interests.
- d) Lowest scores for both social service and persuasive interests.

These four indicated score levels are all significantly different from each other at the 5 per cent level or less.

For the other aptitude tests:

- a) Superior performance on the Iowa Chemistry and Mathematics Aptitude Examinations; also on the ACE.
- b) Significantly lower (but still very high) on the Engineering and Physical Science Aptitude Test and the Paper Form Board.
- c) Still lower (moderately high) on Bennett Mechanical Comprehension.
- d) Lower still (about at the population mean) for Clerical Aptitude, Pegboard, A-S Scale.

Again these four indicated levels for the *S* group are all significantly different from each other at the 5 per cent level or less.

4. Profiles for *S* versus *F* engineering groups have only slight or very moderate similarity; they contain internal checks attesting to their consistency; they may be said to differentiate well the *S* group from the *F*.

5. Analysis of the significant differences among the nine Kuder scales shows the mechanical, artistic, and scientific ones as providing spotlight data for the engineering group because of the score

positions represented by these three scales.

6. Of the other aptitude tests, the most useful as regards significant inter-test differences are the Engineering and Physical Science Aptitude, the Iowa Chemistry and the Iowa Mathematics Aptitude, the ACE, and the verbal part-score of the Clerical Aptitude Test.

7. By means of a variation of the split-half reliability technique, the profiles for both the *S* and *F* groups have been shown to be conventionally reliable.

8. Excellent agreement for the Kuder profile for the entire engineering *S* group was shown when comparable data from the City College of New York were employed.

9. Good agreement for Vocational Service Center *S* and *F* groups against somewhat similar contrasted groups in electronics engineering is found. Agreement is best, however, between the two *S* groups.

10. Evidence is offered to substantiate the claim for the validity of the obtained profiles in terms of complete agreement between findings reported here and other authors' data on occupational success.

## CHAPTER X

### SALESMEN

THE SALES GROUP is one of the more homogeneous of the occupational groups of this study. The follow-up produced a total of 77 Successes (*S* group) and 56 Failures (*F* group). A detailed breakdown in terms of specific occupational objectives has not been attempted, as the majority are simply listed as general salesmen. The group is, in the main, a retail sales group. The *S* group is predominantly a full-time job group rather than a school population. Of the 77 *S*s, 58 (75 per cent) are engaged in full-time selling jobs. The occupational aptitude patterns presented for this *S* group, then, have considerable relevance to job success, although a direct measure of this for validation purposes was not available.

#### A. TESTS UTILIZED

A wide variety of tests were administered to this group. There were sufficient numbers of cases for mean scores to be computed for the following:

- Kuder Preference Record
- ACE (1944)
- Otis Quick-Scoring Mental Ability (Gamma)
- Purdue Pegboard
- Minnesota Paper Form Board
- Bennett-Fry Test of Mechanical Comprehension
- Psychological Corporation's General Clerical Aptitude Test
- Allport Ascendancy-Submission Scale

Table 6 summarizes the appropriate psychometric data in terms of these tests for both the *S* and *F* groups.<sup>1</sup>

<sup>1</sup>The table is similar to that for the engineers (Table 4). In the interests of economy of space, tabular psychometric data for other occupational groups discussed in this monograph will be eliminated, as the figures duplicate a large share of these data. For Tables 6, 10, 11 and 14, order Document 2830 from the American Documentation Institute (ADI), 1719 N Street, N.W., Washington 6, D.C., remitting \$.50 for microfilm (images one inch high on standard 35 mm. motion picture film) or \$.50 for photocopies (6 x 8 inches, readable without optical aid).

#### B. *S* VERSUS *F* SALESMEN

From a total of 24 measures, only three significantly differentiate the *S* from the *F* group. Table 6 is noteworthy for the evidenced mediocrity of the sales group. For this group, the aptitude tests seem less well suited than for the engineers. There is a consistent tendency for the *F* group to earn lower mean scores on a majority of the measures; it is, however, an unreliable one.

On the Kuder scales, only one significant difference between *S* and *F* is discernible—that for the literary interest scale. The *S* group tests at the mean on this scale; the *F*s score significantly above the mean—but only at the 5 per cent level.

The ACE “Q” score earned by the *F* group is significantly below that of the *S*s. This low score falls well in line with the general picture of the average aptitudes of the *S* sales group. This same trend is to be noted, significantly, in the case of the mean scores on the Bennett Test of Mechanical Comprehension.

It was expected that the *F*s would score significantly lower than the *S*s in terms of the A-S Scale, since this type of dominance measure has been found so frequently to differentiate “good” from “poor” salespersons. The trend is to be noted here, but it is an unreliable one.

#### C. SALESMEN VERSUS POPULATION MEANS

Again the picture of mediocrity emerges. Few of the 24 measures show either the *S* or *F* groups to be significantly above or below the estimated population means. In this case the facts are not surprising, since aptitude measures of this type have infrequently demonstrated significant differences in terms of a sales

group. Previous research, of which there has been an extensive amount, has shown that a successful sales group is apt to be significantly different from the population in terms of personal history factors, interest ratings, and the like; the usual aptitude tests are of little value for this occupational area.

Most of the differences that approach statistical significance for the sales group are to be found in terms of interest scores. The *Ss* are significantly inferior to the population mean in terms of mechanical and scientific interests; they are significantly superior as regards musical and persuasive interests. In general, the *F* group duplicates these trends, but at lower levels of statistical significance. The *Fs* are also to be distinguished by their inferior performance in terms of the ACE "Q" score.

Since this is not a college group, the ACE is not the best measure of the intelligence level of the sales group. Despite this fact, however, the group does not depart from the mean. If these obtained ACE scores are converted to Thurstone Mental Alertness scores, the suggested score level differences become magnified. Table 7 makes this explicit.<sup>2</sup>

None of these obtained total scores is significantly above average. The difference between "Q" and "L" scores becomes heightened; they are significantly different from each other at the 1 per cent level. The *Fs* score significantly lower than do the *Ss* only in terms of the "Q" scores.

Both the *S* and *F* groups depart from the population mean on the mechanical ability measures, the *Fs* more frequently and at lower score levels than the *Ss*.

#### D. SALESMAN OCCUPATIONAL APTITUDE PATTERNS

The psychometric data are presented in profile form in Figures 3 and 4. The former presents the mean scores for the nine Kuder scales for the *S* and *F* groups; the latter summarizes the data in similar fashion for the other aptitude tests.

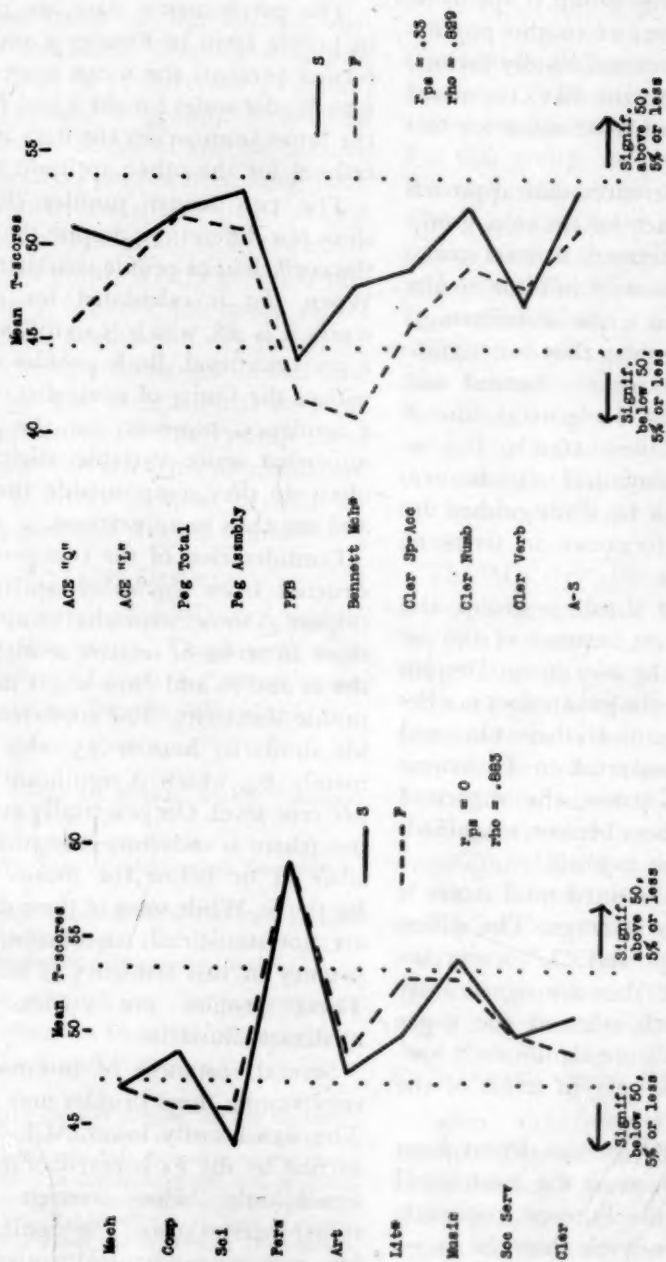
The two Kuder profiles (Figure 3) show few differences, despite the fact that the coefficient of profile similarity is zero. When  $\rho$  is calculated for the nine scores it is .88, which is significant at the 1 per cent level. Both profiles stay well within the limits of normality. There is a tendency, however, for the *Ss* to be somewhat more variable—slightly more often do they score outside these limits and are thus more extreme.

Consideration of the two profiles constructed from the other aptitude tests (Figure 4) shows somewhat more disagreement in terms of relative score ranks for the *Ss* and *Fs* and some slight increase in profile similarity. The coefficient of profile similarity here is .33;  $\rho$ , approximately .83, which is significant at the 1 per cent level. On practically every measure (there is only one exception) the *Fs* score at or below the means obtained for the *Ss*. While most of these differences are not statistically significant, the consistency of this tendency is noteworthy. These profiles are evidencing only moderate similarity.

Several instances of internal consistency among these profiles may be noted. The significantly lower ACE "Q" score earned by the *Fs* is corroborated by the significantly below average computational interest score. The significantly below average mechanical aptitude scores of both *S* and *F* groups check well with the significantly below average mechanical interests of both; similarly, the aver-

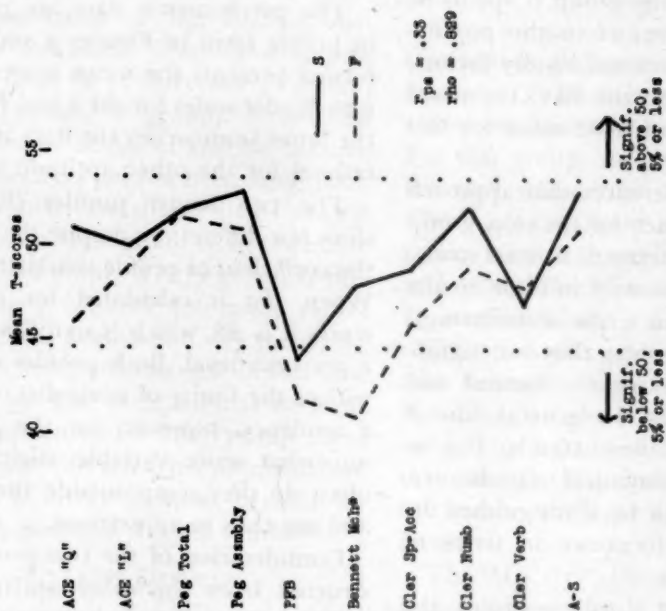
<sup>2</sup> Table 7 filed with ADI. Order Document 3282, remitting \$1.00 for microfilm or \$1.00 for photo copies. See footnote 1, p. 24.





\* Denotes a significant difference between S and P.

FIG. 3. Salesman Occupational Aptitude Patterns, Kuder Scales, S vs. F.



\* Denotes a significant difference between S and P.

FIG. 4. Salesman Occupational Aptitude Patterns, S vs. F.



age clerical interests of both groups agree with the clerical aptitude test scores.

### E. INTER-TEST DIFFERENCES

A chart showing confidence levels for all possible score relationships was prepared on the same plan as that for the engineers. From this type of diagram an estimate of the most discriminating tests may be made, such scores forming a type of "anchor" around which the whole profile tends to hang.

Of the nine Kuder scales, the persuasive and musical scales, because of their score positions, are the most meaningful. Both the *Ss* and *Fs* are characterized by their significantly above average persuasive interest score and their "middle" musical interest score. Considering the *S* group alone, the significant score relationships are: (a) significantly above average persuasive interest, (b) slightly above average musical interest, and (c) significantly below average scientific interest. These three indicated score levels are significantly different from each other at the 1 per cent level.

Turning to the other aptitude tests, few significant vertical score differences are to be noted, due to the consistent trend for all scores to cluster around the mean. This gives little chance for landmarks of any prominence to appear. The outstanding test for the *S* group is the Paper Form Board, because of the significantly inferior performance of the *Ss* on this test. The Paper Form Board is also an excellent differentiating measure for the *Fs*; they, likewise, score significantly below average. In addition, the Bennett Test of Mechanical Comprehension is useful for the *F* group; here, contrary to the *Ss*, the mean score is significantly below average.

The other tests in the battery, such as the ACE and the Clerical Aptitude, contribute little useful spotlight information. Their value from the point of view of counselor data is somewhat negative. Abnormally high or low scores on either of these measures, however, should draw the counselor's attention to the possible unsuitability of a client for a sales objective.

### F. PATTERN CONSISTENCY: INTERNAL CHECKS

The variation of the conventional split-half reliability technique, described for engineers in the previous chapter, has been applied to the sales group. The

*S* group produced two subgroups of 39 and 38 individuals each; the *F* group, two subgroups of 28 individuals each.

The profiles will not be reproduced here. In appearance they are more similar than those for the engineer subgroups, so much so that mere casual inspection shows very close agreement both in profile shape and score magnitudes. For the two *S* groups so split,  $r_{ps} = .73$ ;  $\rho = .88$ . Comparison of the two profiles from the split-*F* group again shows high similarity,  $r_{ps}$  being .60 and  $\rho = .98$ . It is concluded that the obtained profiles for the entire *S* and *F* sales groups fulfill the conventional requirements of reliability.

### G. EXTERNAL CONSISTENCY CHECKS

There are two outside sources against which the Kuder profiles of the present study may be checked.

Kuder supplies norm data (unpublished) for two groups of salespeople, retail and wholesale. The mean percentiles for the nine scales for these two groups were so alike that they have here been combined. A comparison of these data against those of the VSC *S* group shows the overall agreement here is not great. The profile shapes correspond only very slightly ( $r_{ps} = 0$ ); the value for  $\rho$  is .43, which cannot be said to be significantly different from zero. But the picture is not as unreliable as might first appear. The greatest discrepancies (i.e., in directions not expected) are to be noted for the three artistic and the social service scales, shown to be the least discriminative scales for the *S* group. The two outstanding anchors for the *S* group were the high persuasive and low scientific interest scores. The Kuder norm group data agree well with this generalization. The two profiles also agree in terms of the mechanical, computational, and clerical scores.

A more pertinent comparison, since there are data for both the *S* and the *F* group, is found in the recent study by Kahn and Hadley (16) of a group of "new" life insurance agents attending a course in Life Insurance Marketing at Purdue University during 1946. The group was largely a veteran one. The subjects had each received a five-week basic course and had also completed thirteen weeks of selling in the field for which production records were available. Among the

psychological tests administered to these agents, the Kuder Preference Record was the only one identical with test results reported upon here. The Purdue group was divided into thirds via these production records, the top ( $N = 26$ ) and bottom ( $N = 23$ ) third being designated as the *S* and *F* group, respectively.<sup>3</sup>

As was the case with the VSC *S* versus *F* Kuder profile data, Kahn and Hadley's profiles here showed few differences. Calculation of  $r_{ps}$  and  $\rho_{ho}$  by the present writer from these authors' data (16, Table 2, p. 137), after conversion into VSC *T*-scores, produced the values of .50 and .88, respectively. It was only on the clerical interest scale that the *S*s were significantly different from the *F*s (at the 1 per cent level, the *S*s scoring lower than the *F*s). These *S*s also score lower than do the *F*s on the literary interest scale—but not significantly so as was the case when VSC data were analyzed.

The data for the two *S* groups, however, check very well. When the Kuder profiles for the VSC *S* group and those for Kahn and Hadley's are superimposed, the agreement is close ( $r_{ps} = .50$ ;  $\rho_{ho} = .81$ ), despite the fact that the scores for this Purdue group have a larger spread than do VSC scores. The largest discrepancy here, although in the expected direction, is seen for the persuasive interest scale scores; Kahn and Hadley's group earn the very high *T*-score of 68, while the VSC *S* group score is 59. Both of these scores are, of course, well above the mean of 50.

When the two *F* groups are contrasted, the picture is not as favorable. The two profiles do not agree well as regards line slopes ( $r_{ps} = 0$ ), but they do agree as regards relative Kuder score rank positions ( $\rho_{ho} = .87$ ). The significantly low scientific and the significantly high persuasive interests of both of these groups are the outstanding landmarks.

## H. VALIDITY

There are several published occupational ability patterns for various groups of sales personnel, both male and female. Not all of these patterns are comparable to results reported in this study.

Trabue (29, Figure 2, p. 347) reports median percentiles on a battery of tests for two groups of department store saleswomen in two mid-western cities. The present writer has averaged these two sets of data. Despite the fact that these

data are based on an exclusively female population, the results may be taken as suggestive.

Dvorak publishes occupational ability patterns for three groups of sales personnel: retail salesmen (11, p. 42), insurance salesmen (p. 42), and retail saleswomen (p. 16). Only the two retail groups will be used for comparison with present data; of these two, only the male retail group truly corresponds to VSC results.

Dodge reports patterns also for three sales groups: traveling salesmen, retail salesmen, and retail saleswomen (9, p. 37). Of these only the male retail group will be utilized here.

Table 8 presents in summary *T*-score and descriptive form the data from all these reports that have relevance to the present *S* group.<sup>4</sup>

Consider, first, the two male groups. The agreement from the two studies when set against the *S* group of the present study is, with the exception of the Dvorak Clerical Test data, quite striking. The groups are at the population mean as regards abstract intelligence. This checks well with the obtained *T*-score of 55 on the Otis Gamma and that of 50 for the ACE total score found for the present *S* group. The Otis Gamma score is the better comparison to make when set against the Pressey. The undistinguished average score for the O'Connor Vocabulary, reported by Dodge, checks well with the ACE "L" score of 50 on the present *S* group.

Dvorak has two mechanical ability scores, both of which are approximately at 50. This agrees well with the obtained Bennett Mechanical Comprehension score of 48 for the *S*s. The same author reports mean *T*-scores of 52 and 54 for the two O'Connor dexterity tests. The Purdue Pegboard scores in the present battery are 52 and 53.

Dodge reports an average Bernreuter score for social dominance. This is corroborated by the average A-S Scale score found for the *S*s.

The sole disagreement, as noted above, is in the clerical aptitude scores. Dvorak reports her group of retail salesmen earned scores significantly above the population mean on the Minnesota Clerical; Dodge fails to find this superiority for the same test. The scores for the two parts of the Clerical Aptitude Test that are similar to the Minnesota number and name checking, are here 49 and 52. Why Dvorak's male group should earn such superior clerical scores is somewhat of a puzzle. At any rate, these findings are at variance with the other data reported in Table 8.

Turning to a consideration of the scores for saleswomen, all of the statistics show in the main an undistinguished average performance. Two exceptions may be noted: Dodge's group

<sup>3</sup> This is, of course, a "special" sales group. It was not randomly selected, and it represents a restricted range of talent. See the critique of this study by Wallace (30), followed by a reply from Kahn and Hadley (17).

<sup>4</sup> Table 8 filed with ADI, Document 3282. See footnote 2, p. 25.

is below average in abstract intelligence; data from Dvorak and Trabue do not confirm. Trabue finds his females somewhat poorer in spatial relations, whereas Dvorak's group is at the mean. In the main, however, the typical "average" sales profile—also found in the present study on a sample almost exclusively male—is corroborated.

In summary it may be said that the over-all agreement between these occupational ability patterns and the aptitude patterns for the *S* group in the present study is excellent. The obtained *S* pattern may then be said to be valid in these specified respects.

### I. SUMMARY

On the basis of 77 Successes (*Ss* predominantly a full-time job group) and 56 Failures (*Fs*) that comprise the total sales group, the following summary may be made for the occupational aptitude pattern data presented in this chapter.

1. Three measures significantly differentiate the *Ss* from *Fs*: higher literary interest, ACE "Q," and Bennett Mechanical scores. The *S* group scores approximately at the mean on all three.

2. In terms of estimated population means, the *S* group deviates on few measures. The over-all picture of the *Ss* is an "average" one. The *F* group more often departs from this average performance level; in this sense, the *Fs* are atypical.

3. Profiles for *S* versus *F* groups are not clearly dissimilar. The non-Kuder tests provide better differentiation than do the interest scores. Internal checks, however, attest the consistency of these profiles.

4. The patterns for the *S* group may be summarized thus in terms of interest score significant differences:

For the Kuder scales:

a) Significantly above average persuasive interests.

b) Significantly above average (but lower) musical interests.

c) Significantly below average scientific interests.

These three score levels are significantly different from each other at the 1 per cent level.

For the other aptitude tests:

At the population mean for all tests except the Paper Form Board, on which the group tests significantly below.

5. Analysis of the significant differences among the nine Kuder scales for both *S* and *F* groups shows the persuasive and musical scales as the most discriminative because of their score positions.

6. Of the other aptitude tests, the Paper Form Board is the outstanding one because of the significantly inferior performance of both *S* and *F* groups. Other scores cluster about the mean.

7. Employment of the variation of the split-half technique showed the profiles for both *S* and *F* groups are conventionally reliable.

8. One external check for the nine interest scores against Kuder norm group data showed agreement only as regards the important scales. Discrepancies were noted for interest scales that were least discriminating in terms of a sales group.

9. Very good agreement was found for the Kuder *S* group profile when contrasted with that for a group of successful life insurance agents for whom production records were available. Agreement was less clear, however, when the two *F* groups from these sources were compared.

10. Evidence is offered in support of a claim for validity of the obtained occupational aptitude patterns for the *S* group, since these patterns check well against data which involved an outside criterion.

## CHAPTER XI

### THE CLERICAL GROUP

THERE IS a total of 54 Successes (*S* group) and 40 Failures (*F* group) for this category. Since the group is a heterogeneous one, the entire clerical sample has been separated into two categories; these categories will be qualified in the ensuing discussion. The *S* group is mainly composed of people on the job. Of the 54 *S*s, 38 (70 per cent) are engaged on full-time clerical jobs in accordance with their stated objective.

Attention is called to the fact that accountants are excluded from this group. These will be discussed as a distinct group (chap. XII), as it is customary to treat such a professional group as separate from a general clerical sample.

#### A. TESTS UTILIZED

The group as a whole has been administered a wide selection of tests. There were sufficient cases for the following to allow for mean score computation:

Kuder Preference Record  
ACE (1944)  
Otis Quick-Scoring Mental Ability (Gamma)  
Psychological Corporation's General Clerical Test  
Purdue Pegboard  
Minnesota Paper Form Board  
Bennett-Fry Test of Mechanical Comprehension  
Allport Ascendancy-Submission Scale

#### B. ALL CLERICALS

The writer first treated the group as a whole and then proceeded to locate differences between *S*s versus *F*s versus population means. The efforts were largely unproductive. When mean scores for the total clerical sample were computed, the picture of mediocrity was an unrelieved one. Few significant differences were demonstrable between *S* and

*F* groups. What differences there were in terms of population means all showed the group to be significantly below average. The only measure that discriminated *S*s from *F*s was the Clerical Aptitude test, the *S*s scoring approximately at the mean and the *F*s significantly below.

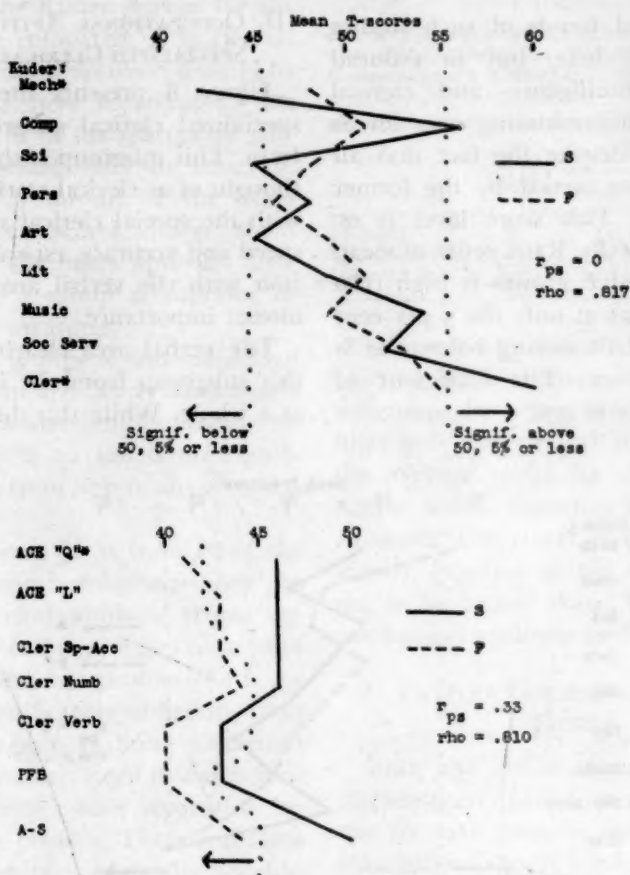
#### C. TWO CLERICAL SUBGROUPS

The obtained mean scores led to the suspicion that the *S* and *F* clerical groups, considered as units, were too heterogeneous. The *Dictionary of Occupational Titles (DOT)* code numbers offered a way out of the dilemma, since by this means the group could be divided into what is here termed a "general clerical" versus a "specialized clerical" subgroup. A disadvantage was the corresponding reduction in the numerical size of the contrasted *S* and *F* groups. All clerical occupations with *DOT* code numbers of 1-0 and 1-1 were sorted into one group; all those commencing with 1-3 into another. This procedure split the entire clerical group approximately into halves.

The former group (*DOT* numbers 1-0 and 1-1) contains the general clerical workers, the ones characterized by such titles as general clerk, editing clerk, personnel clerk, etc. These are the persons without particular training in machine skills and whose duties might be described as of a general office nature. There are 31 *S*s and 23 *F*s in this general clerical subgroup.

The latter group (*DOT* numbers 1-3) are here labeled the "specialized clerical" subgroup. These are the persons utilizing technological office skills. Typists, secretaries, stenotype operators, and the like are found here. Twenty *S*s and 14 *F*s comprise this group.





\* Denotes a significant difference between S and F.

FIG. 5. Occupational Aptitude Pattern, General Clerical Subgroup, S vs. F.

Tables 10 and 11,<sup>1</sup> and Figures 5 and 6 summarize these data, citing only the five tests which were the discriminating ones when "all clerical" S versus F groups were contrasted. The Otis Gamma, the Pegboard, and the Bennett Mechanical test data therefore do not appear.

#### D. OCCUPATIONAL APTITUDE PATTERN: GENERAL CLERICAL SUBGROUP

Figure 5 presents the psychometric data in profile form. The S group of the

general clerical subgroup is clearly superior to the Fs on clerical interest, and significantly inferior to the Fs on mechanical interest. The S and F profile dissimilarity is shown with  $r_{ps}$  being zero;  $\rho$ , however, is .82 (significant at the 2 per cent level), indicating no very high degree of dissimilarity.

With respect to the other aptitude tests, the mediocrity of this general clerical subgroup—both Ss and Fs—is noteworthy. In fact, they do not seem like the typical clerical worker at all in terms of reported studies on such groups. The

<sup>1</sup> Tables 10 and 11 filed with ADI, Document 2830. See footnote 1, chapter X, p. 24.

generally found trends of such studies are duplicated here, but in reduced dimensions; intelligence and clerical tests are the differentiating ones for *Ss* as against *Fs*, despite the fact that all the mean scores earned by the former are below 50. This score level is especially noteworthy. Rank order of mean scores for *S* and *F* groups is high ( $\rho = .81$ , significant at only the 5 per cent level), with the *Fs* scoring below the *Ss* on every measure. The coefficient of profile similarity is .33.

#### D. OCCUPATIONAL APTITUDE PATTERN: SPECIALIZED CLERICAL SUBGROUP

Figure 6 presents the data for the specialized clerical subgroup in profile form. This subgroup is the one typically thought of as clerical workers—the group with the special clerical skills for which speed and accuracy, especially in connection with the verbal area, are of paramount importance.

The verbal area clearly differentiates this subgroup from the clerical sample as a whole. While this differentiation is

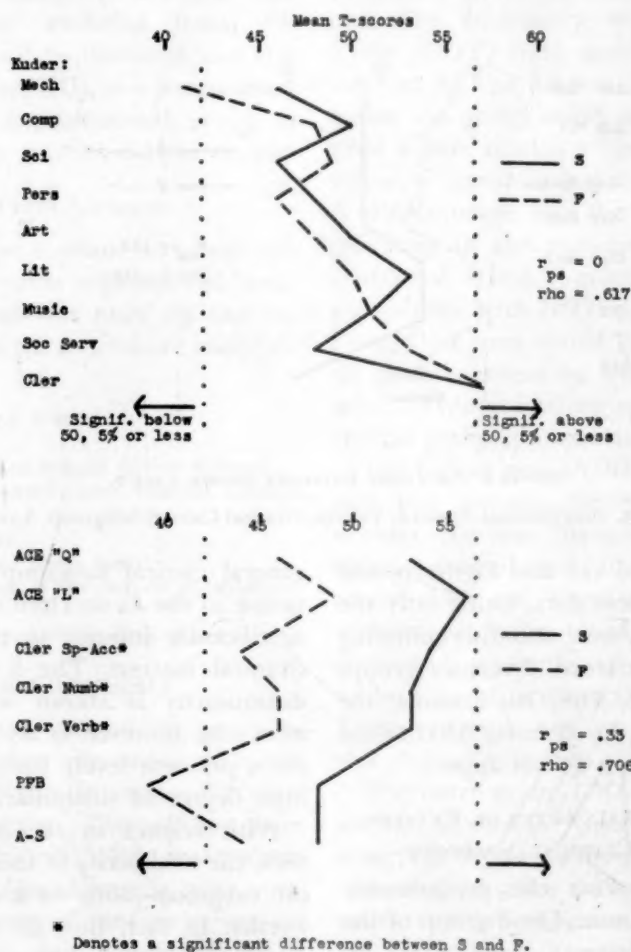


FIG. 6. Occupational Aptitude Pattern, Specialized Clerical Subgroup, *S* vs. *F*.

evident when the Kuder profiles for the two groups are compared, it is clearest in terms of the other aptitude tests. (The profiles are not here reproduced.) On the Kuder, the *Ss* of the specialized subgroup are superior only in terms of clerical interests; on all of the other eight scales their scores cluster about the mean. For the other aptitude tests, the specialized *S* group is superior or average on all measures.

The *S* and *F* groups of this specialized clerical subgroup are clearly distinguishable. The two Kuder profiles produce an  $r_{ps}$  of zero;  $\rho$  is .62 and is not significantly different from zero in any accepted sense.

Clear separation of *Ss* from *Fs* of the specialized clerical subgroup may be noted. All clerical aptitude scores significantly differentiate the two contrasted groups. For these two profiles  $\rho$  is .71 (again not significantly different from zero), and  $r_{ps}$  is only .33. Score differences here are outstanding. Even casual inspection demonstrates a wide separation between the two profiles. The parallelism of the two profiles is especially notable. As with the *Fs* for the previously described general clerical subgroup, the *Fs* for this specialized clerical subgroup are consistently below the means for the *Ss* on all measures.

The scores for the *S* group of the specialized clerical workers agree well with the published norms for clerical workers on the Psychological Corporation's General Clerical Aptitude Test. This manual (34, Table 1, p. 6) reports standardization data for 143 office employees (not otherwise described). After conversion of all scores into VSC *T*-scores, the differences emerge as indicated in Table 12.

Calculation of the relevant significance ratios for the data in Table 12 confirms the significantly below average performance of the general clerical subgroup. All of the mean scores cited for this group are significantly below the manual's norm data at the 1 or 2 per cent level. The present specialized subgroup is practically identical with the manual's norm data.

TABLE 12

MEAN *T*-SCORES OF CLERICAL SUBGROUPS VERSUS STANDARDIZATION DATA, PSYCHOLOGICAL CORPORATION'S GENERAL CLERICAL APTITUDE TEST

	Total Score	Part Scores		
		Sp.-Acc.	Numb.	Verb.
Manual	54	57	53	49
Specialized <i>Ss</i>	53	54	53	53
General <i>Ss</i>	45	46	46	43

To summarize the measured characteristics of the *Ss* of this specialized clerical subgroup, its scores were: significantly high only for clerical interests; within the average range for the other eight Kuder scales; superior on the Clerical Aptitude Test (total as well as all part-scores); superior on the ACE, "L" tending to be higher than "Q"; average on mechanical aptitude and the A-S Scale.

#### E. PATTERN CONSISTENCY: INTERNAL CHECKS

Since the entire clerical sample has already been divided into two subgroups, the *Ns* have been so reduced that it is impossible to apply a split-half reliability check. What may be done, however, is to compare the two *S* and the two *F* groups for these two subsamples in a search for dissimilarity. The *S* group of the general clerical sample should be dissimilar as regards pattern from the *Ss* of the specialized clerical subgroup. These two profiles, then, ought to show moderate, but not high, similarity;  $\rho$  should not approach the conventional reliability standard of .90.

Consider, first, the *S* groups of the general clerical versus the specialized clerical subgroups. For the contrasted Kuder profiles,  $r_{ps}$  is only .50, indicating moderately high similarity only;  $\rho$  is .70 (and not significantly different from zero in the accepted sense). These values are not consistent with any statement to the effect that the two groups are alike. The obtained differences for the other aptitude tests are very striking.

ing. All ACE scores and all clerical aptitude test scores significantly differentiate the two *S* groups, the general clerical *Ss* scoring below the specialized *Ss*. For these contrasted profiles,  $r_{ps}$  is  $-1.00$ ;  $\rho$  is  $.25$ . Clear separation of the two groups is thus indicated.

Look next at the two obtained *F* groups. A similar picture emerges, but not one that is as clear-cut as with the two *S* groups. However, the lack of much agreement between profiles is still to be noted. The two contrasted Kuder profiles here produce an  $r_{ps}$  of  $.50$ , and  $\rho$  is  $.78$  (significant at the 5 per cent level). These indices do not give a clear picture of dissimilarity. In the case of the profiles based on the other aptitude tests, the dissimilarity features between these two *F* groups become more sharp. Here  $r_{ps}$  is zero;  $\rho$  is  $.77$  (not significant in the generally accepted sense). Like the *Ss*, the *Fs* belonging to the general clerical subgroup score below the specialized clerical *Fs* on practically all measures.

#### F. EXTERNAL CONSISTENCY CHECKS

One study offers a consistency check for these obtained clerical patterns. Hahn and Williams (13) report data for the Kuder Preference Record for satisfied and dissatisfied women Marine clerical workers. A relevant comparison may be made between the high ( $N = 25$ ) and low ( $N = 14$ ) job-adjustment stenographers against the *S* and *F* groups of the specialized clerical workers. The *F* group is, of course, not strictly comparable to Hahn and Williams' dissatisfied group, but it is instructive to note what similarities exist.

Very close agreement exists for the specialized *Ss* as against Hahn and Williams' high group. Here  $r_{ps}$  is  $.50$ ;  $\rho$  is  $.89$  (significant at the 1 per cent level). When these two profiles are graphed they are seen to be identical in all important respects, discrepancies occurring only on the literary and artistic scales. Sex differences in the two samples might well account for such differences. Contrasting Hahn and Williams' low group with the specialized *Fs* shows little agreement. Here  $r_{ps}$  is still  $.50$ ;  $\rho$ , however, is much reduced ( $.36$  and not significantly different from zero). The mean scores for social service and clerical interests are strikingly at variance. The two samples are therefore quite distinct, a difference that is here attributed to their diverse composition and to the fact that, in reality, Hahn and Williams' low group are not really failures at all.

Other comparisons in terms of significant differences noted in Hahn and Williams for other groups of women Marine clerical workers check well with data of the present study. Of the various Marine clerical workers, only the general clerks—as against all other clerical worker sam-

ples here—were significantly superior in computational interest; the high group of this sample earned, in addition, significantly higher scores for both computational and clerical interests than did the low group. The VSC data for the general clerical subgroup check nicely on all three of these counts.

#### G. VALIDITY

Clerical groups have received much attention from researchers in the area of occupational ability patterns. Trabue (29) has reported on four groups of clerical workers, Dvorak (11) on two, Dodge (9) on four.

Trabue's patterns all showed high similarity. Highest scores were earned on the Minnesota Clerical Test; lower (but still high) on the Pressey and the O'Connor Dexterities; below average on dominance (Bernreuter); very low on the Minnesota Spatial Relations Test. The relevant comparison is with the general clerical subgroup of the present study. These *Ss* earn clerical aptitude scores, as well as ACE scores,<sup>2</sup> that are not significantly below average. The level of these scores is above that of the Paper Form Board score, duplicating the difference reported by Trabue. The A-S Scale score places the *Ss* at the mean rather than at the submissive end of the scale. On the whole, there is only moderate agreement. It is difficult to say more since so little is known of the precise composition of Trabue's groups.

Trabue also reported on a group of nine poorest public school clerks, data for which may be compared with the general clerical *Fs*. These poorest clerks scored below average on all the measures used, with the exception of the dominance scale. The data for the general clerical *Fs* are in agreement.

Dvorak presents patterns for men and for women clerical workers (11, p. 12, p. 16). The *Ss* of the general clerical subgroup agree with these data as regards relative score levels: "best" scores were earned on the clerical aptitude and intelligence tests; lower scores on the mechanical ability measures.

Dodge (9) presents patterns for specific clerical groups. A group of 50 women stenographers were found to be significantly below average on

<sup>2</sup> The ACE score is not, of course, to be directly compared to the Pressey. The Thurstone Mental Alertness score would be the better comparison. The obtained ACE total *T*-score of 45 is roughly equivalent to a TMA *T*-score of 52. This latter score well agrees with the *T*-score for the Pressey in Trabue's report of 57.



the Pressey (a result which is at variance with other studies of clerical workers) and significantly above average on the Minnesota name checking. A group of 50 women secretaries were average on these same tests but scored significantly above the mean on the O'Connor Vocabulary. These data may be checked against those for the *Ss* of the specialized clerical sample of the present study. This group scores significantly above the population mean on the ACE; it also scores above the mean (but not significantly so) on the speed-accuracy section of the Clerical Aptitude Test, the part-score most closely corresponding to the Minnesota Clerical. The high ACE "L" score of these *Ss* agrees with Dodge's finding of the superiority of the secretaries on the vocabulary test. Dodge reports both clerical groups to be average in terms of dominance; the specialized clerical *Ss* are likewise at the A-S Scale mean.

Data from Dodge for a group of 50 women office clerks agree well with the trends shown for the *Ss* of the general clerical subgroup of the present study. Data for a group of 54 male bookkeepers showed them to be average on all measures utilized except that of dominance, on which they scored below the mean; the general mediocrity of the general clerical *Ss* in the main confirms these trends.

The validity checks for the two clerical subgroups have been somewhat difficult to make. Previous published work on occupational ability patterns has not always dealt with well-defined clerical samples. Despite this fact, generally good agreement for the various profiles has been noted; in connection with Dodge's data, where the most relevant and significant comparisons may be made, there is excellent corroboration for the obtained profiles of this study. The patterns may be said, then, to be valid in at least these specified respects.

#### H. SUMMARY

1. A total of 54 Successes (*Ss*) and 40 Failures (*Fs*) comprise the clerical sample. The majority of the *Ss* are full-time, employed workers.

2. Few significant differences are found between *S* and *F* groups. Only the Clerical Aptitude Test scores differentiated

these contrasted groups. The profiles are noteworthy for the evidenced mediocrity of the entire sample. Regardless, the aptitude patterns for these two groups are distinct, the *Fs* scoring below the *Ss* on a majority of the 22 measures employed.

3. Since the entire clerical group proved to be too heterogeneous, two subgroups were formed: a "general" and a "specialized" subgroup. Two relatively homogeneous groups were thus secured. Clear differences between *S* and *F* groups comprising these two subsamples were obtained. This shows the futility of dealing with such an over-all designation as clerical workers in general, as has been repeatedly done in earlier studies.

4. With respect to the Kuder scales, the *Ss* of the general clerical subgroup show:

- a) Highest score for clerical interest—significantly above average.
- b) Moderately high computational interest.
- c) The mean score for persuasive interest.
- d) Significantly below average mechanical interest.

These four score levels are significantly different from each other.

With respect to the other aptitude tests, the *Ss* of the general clerical subgroup present a general picture of mediocre aptitudes, with the exception of a significantly inferior performance on the verbal part of the Clerical Aptitude Test.

The profiles constructed for the *S* versus *F* groups show much dissimilarity in aptitude scores despite the fact that relative score ranks agree closely.

5. The *Ss* of the specialized clerical subgroup show more of the characteristics expected of a clerical sample. On the Kuder, the *Ss* of the specialized cleri-

cal subgroup make a significantly high mean score only on clerical interest. On the other aptitude tests they make superior Clerical Aptitude Test scores, superior ACE scores ("L" tending to be higher than "Q"), and only average mechanical aptitude and A-S Scale scores.

The profiles constructed for the *S* versus *F* groups of the specialized clerical subgroup are clearly distinguishable.

6. Profile comparison of the *S* groups of the general clerical and the specialized clerical subgroups showed clear separation,

especially in regard to the aptitude test scores other than the Kuder. The same applied when the two *F* groups were contrasted.

7. External consistency checks for the obtained Kuder profiles for the *S* groups showed clear agreement in results; less good agreement was obtained for the *F* group contrasts. The two *F* groups involved, however, were not equivalent.

8. Validity checks for both general and specialized subgroups produced corroboration of the obtained aptitude patterns.

## CHAPTER XII

### ACCOUNTANTS

A TOTAL of 74 Successes (Ss) and 24 Failures (Fs) comprise the contrasted groups of accountants. Due to the small size of the *F* group, attention is here directed largely to the Ss. The groups are largely composed of individuals pursuing full-time schooling. Of the 74 Ss, 56 (76 per cent) are engaged in full-time business school training.

#### A. TESTS UTILIZED

Mean scores could be computed for the following:

Kuder Preference Record  
ACE  
Psychological Corporation's General Clerical Test  
Lee-Clark Fundamentals of Arithmetic Test  
Purdue Pegboard  
Allport Ascendance-Submission Scale.

Table 14 presents all relevant psychometric data for these tests for the *S* and *F* groups.<sup>1</sup>

#### B. *S* VERSUS *F* ACCOUNTANTS

Only two obtained differences between *S* and *F* groups correspond to significant statistical differences in the accepted sense. The *F*s are significantly inferior on both the computational and clerical Kuder scales. The trend on the other scales, most of which bear little logical relationship to accountancy success, is for the *F*s to earn higher mean scores than do the Ss.

For the *S* group, special mention should be made of the Clerical Aptitude Test scores since the base for *T*-score computation was local VSC norm data. These obtained scores check well with norm data indicated for employed cleri-

cal workers in the manual (34, Table I, p. 6). The only reliable difference is found for the numerical part-score, the *S* group earning a mean score above that of the employed clerical workers.

#### C. ACCOUNTANTS VERSUS POPULATION MEANS

Practically all of the psychometrics differentiate the accountants from average. Significantly, on the two Kuder scales which differentiate *S* from *F*, the Ss' obtained differences above population means are very clear. The superiority of the group on the Clerical Aptitude Test is as expected—as is also the case with the ACE and the two mathematical tests. The measures which produce consistently average scores, both for *S* and *F* groups, are the "non-clerical" interest scales and the A-S Scale.

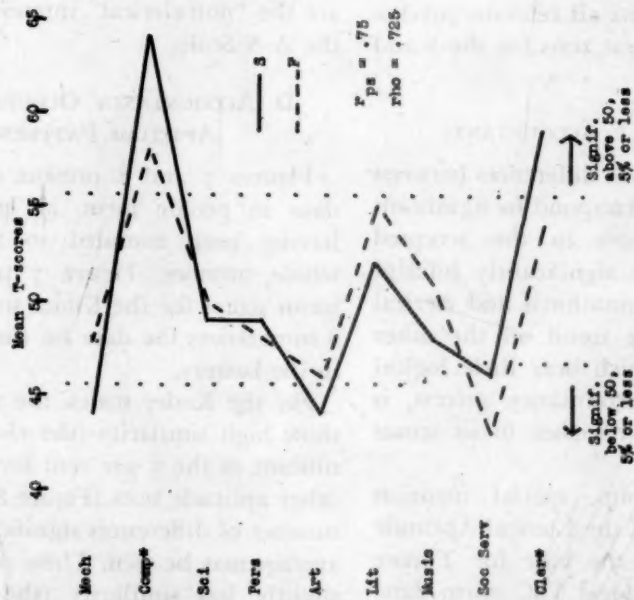
#### D. ACCOUNTANCY OCCUPATIONAL APTITUDE PATTERNS

Figures 7 and 8 present all of these data in profile form, all mean scores having been rounded to the nearest whole number. Figure 7 presents the mean scores for the Kuder scales; Figure 8 summarizes the data for the other tests in the battery.

For the Kuder scales, the two profiles show high similarity (the *rho* value significant at the 5 per cent level). For the other aptitude tests (Figure 8), a greater number of differences significantly above average may be seen. These profiles show slightly less similarity (the *rho* value being, again, significant at the 5 per cent level). Both profiles show clear demarcation from average.

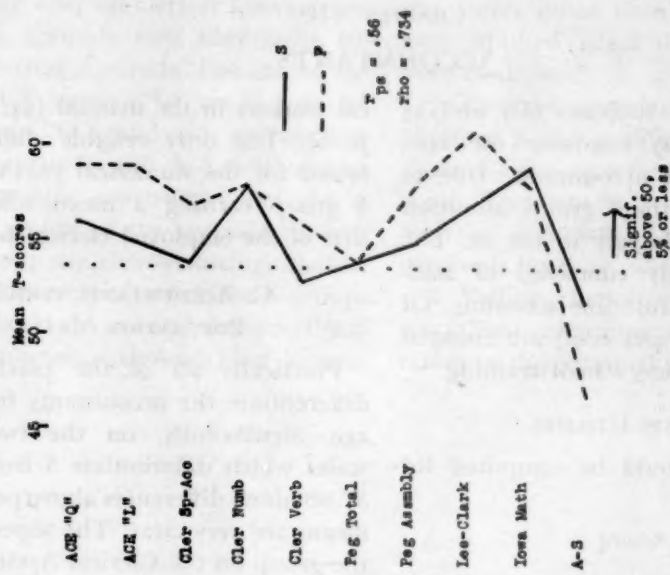
The profiles offer certain internal

<sup>1</sup> Table 14 filed with ADI, Document 2830. See footnote 1, chapter X, p. 24.



\* Denotes a significant difference between S and F.

FIG. 7. Accountancy Occupational Aptitude Patterns, Kuder Scales, S vs. F.



No significant differences between S and F.

FIG. 8. Accountancy Occupational Aptitude Patterns, S vs. F.



checks. The high ACE "Q" score, as well as the high Lee-Clark and Iowa Mathematics Aptitude scores, check well with the high computational and clerical Kuder scores. The average persuasive interest score agrees with the obtained A-S score, none of these being significantly different from average. The lower verbal part-scores on the Clerical Aptitude Test are consistent with the lower ACE "L" scores.

#### E. INTER-TEST DIFFERENCES

In terms of inter-test differences, the diagnostic signs from the Kuder scores for the *S* group are: (a) highest score for the computational scale, (b) lower, but still very high, clerical interest, (c) approximately average for literary interest, and (d) lowest mean scores for both mechanical and artistic interests. These four indicated score levels are significantly different from each other at the 5 per cent level.

In regard to the other aptitude tests, especially for the *S* group, the numerical tests show up as most discriminating. Inter-test differences (each significantly different from the other at the 5 per cent level) for the *S* group are: (a) highest scores for the Iowa Mathematics Aptitude and the numerical part-score of the Clerical Aptitude Test, (b) above average, significantly but not greatly, as regards the speed-accuracy section of the Clerical Aptitude Test, and (c) approximately at the mean for the verbal section of this test as well as for the A-S Scale. Attention is called to the extensive role being played by the Clerical Aptitude Test, every one of the part-scores providing important information about the *S* group.

#### F. PATTERN CONSISTENCY:

##### INTERNAL CHECKS

The consistency of the *S* group profiles has been checked by the type of split-half reliability technique previously described. The *F* group was too small to allow for this; the *S* group was, accordingly, split into two groups, both of which contained 37 cases. When such results are graphed, very close agreement is seen for the two profiles (not reproduced):  $r_{ps} = .57$ ;  $\rho = .91$ . What discrepancies exist are to be found in terms

of the "non-relevant" indices—such as those for literary and musical interest and for the two Pegboard scores.

#### G. EXTERNAL CONSISTENCY CHECKS

There are two outside sets of data against which the obtained Kuder profile for the *S* group may be checked. These comprise data supplied by Kuder (unpublished) for an accountancy group for which the *N* is unknown but whose numerical size is probably small; and, also, data reported by Perry and Shuttleworth (23) for students at City College of New York. This latter group is not as "pure" as one might wish. These authors report median Kuder scores for a group of 128 business administration majors; they state, however, that the group is largely composed of accountancy majors. The profiles themselves will not be reproduced here. All of the indices show good agreement: the  $r_{ps}$  values evidence moderately good similarity for profile shapes; the  $\rho$  values are between .57 and .86, all of which are significantly different from zero at at least the 5 per cent level.

#### H. VALIDITY

Only Dodge (9) has published an occupational ability pattern for accountants ( $N = 47$ ). Of the tests in his battery, only the number checking part of the Minnesota Clerical Test showed this group to be statistically above the population average. The group was within the average range on the Pressey, the O'Connor Vocabulary Test and the Bernreuter social dominance scale. Our accountancy *S* group agrees in all respects, if one allows for the necessary modification in terms of the substituted intelligence test (the more difficult ACE in place of the Pressey). The "best" score earned by the *Ss* on the Clerical Aptitude Test is that for the numerical part ( $T$ -score = 58, superior to the population mean at the 1 per cent level). The Minnesota number and name checking scores are similar to the speed-accuracy and numerical part-scores of the Psychological Corporation's Clerical Aptitude Test. Data from Dodge and the present study are in agreement. The *Ss*, also consistent with Dodge's data, are average on the A-S Scale. Dodge also reports average performance of his accountants on a vocabulary test; the *S* group earns an average score on the verbal section of the Clerical Aptitude Test, although the ACE "L" score is significantly above average.

A discrepancy does exist in terms of the intelligence test data: Dodge finds his group average, whereas the *S* group is superior to the average college freshman on the ACE. This difference is undoubtedly a function of the fact that

the *Ss* of the present study are largely a college population and younger than the mean age of Dodge's accountants.

These are, admittedly, limited data against which to check the validity of the present occupational aptitude pattern. It may be said, however, that within the limits of these comparisons, the pattern for the accountancy *S* group is valid.

### I. SUMMARY

In terms largely of 74 Successes (*Ss*) whose primary goals are that of accountancy, the following summary statements may be made:

1. The *S* group is characterized by high clerical and computational interests, high clerical aptitude scores, and high mathematical aptitude scores. While the group is superior to the population mean on the intelligence test (the ACE), its superiority is most notable on the other, non-intelligence tests.
2. Only the Kuder computational and clerical scores reliably distinguish the *Ss* from the *Fs*.
3. The *S* group is significantly above the population mean on most of the tests employed. It is significantly below average on mechanical and social service interests. It is at the mean on the scientific, persuasive, literary, and musical scales of the Kuder; on the Purdue Peg-board; and on the A-S Scale.
4. From the point of view of significant (5 per cent level) inter-score dif-

ferences, the *S* group pattern may be summarized thus:

For the Kuder, scores were:

- a) Highest for computational interest.
- b) Lower (still very high) for clerical interest.
- c) Approximately at the mean for literary interest.
- d) Lowest for both mechanical and artistic interests.

For the other aptitude tests, scores were:

- a) Highest for Iowa Mathematics Aptitude and for the numerical part-score of the Clerical Aptitude Test.
- b) Lower, but significantly above average, on the speed-accuracy subsection of the Clerical Aptitude Test.
- c) Average for both the clerical verbal part-score and the A-S Scale.

5. The obtained profiles for *S* versus *F* groups do not show great dissimilarity. Better differentiation is seen for the profiles based on the non-Kuder tests. The profiles show, however, many signs of consistency, internal and external.

6. The split-half reliability technique, applied only to the *S* group, showed this pattern to be conventionally reliable.

7. An external consistency check in terms of the Kuder profile data showed consistent agreement for the "best" scales.

8. Evidence is offered to demonstrate that the aptitude pattern for the *S* group agrees well with published data of one other study checked against an outside criterion.

## CHAPTER XIII

### THE PROBLEM OF OVER-ALL SIMILARITY-DISSIMILARITY OF S GROUP PROFILES

THE PRESENT report has dealt, up to this point, with profile differentiation in terms of *S* versus *F* groups within the same occupational area. One of the cornerstones of pattern analysis work of this sort is that profiles constructed for different occupational areas must show clear evidence of dissimilarity. Profiles compared for two occupational areas with fields of work in common would then be expected to exhibit some similarity—moderately high, but certainly not excessively so.

Before the profiles presented in this report may be said to possess any real utility for vocational and educational guidance purposes, it must be demonstrated that there are clear differences among them—that, for example, the patterns presented for the engineer or sales groups are clearly distinct from, say, the patterns for the accountancy or specialized clerical groups. This type of differentiation must exist in addition to profile differences within the same occupational area for the *S* versus *F* groups thereof.

The same indices of similarity-dissimilarity that have been previously employed ( $r_{ps}$  and  $\rho$ ) are again used for such inter-group comparisons. While these served usefully for comparisons of profiles based on subsamples within the same occupational area, the indices when put to work on such heterogeneous samples are not as sensitive as one might wish. They provide, however, an estimate of the proportionate amount of similarity-dissimilarity between profile pairs; both ignore the absolute magnitudes of score differences used for comparison.

Let us assume, for example, there are five tests and two groups, occupationally very different. The two groups of subjects earn the following mean scores on these five tests:

Group *A*: *T*-scores of 40, 43, 35, 42, 35 respectively.

Group *B*: *T*-scores of 62, 69, 58, 63, 58 respectively.

If these two series of mean scores were graphed, the result would be approximately parallel profiles with a wide area of separation between. In this instance,  $r_{ps}$  would be  $+1.00$ ; so, in addition, would  $\rho$ . Yet the profiles are still very different, if merely from the point of view of the absolute magnitude of the obtained score differences. Every one of these "horizontal" or inter-group differences would be significant if the groups involved were large samples.

Also ignored in the technique above are the significant "vertical" or inter-test differences that may exist. Thus, while  $r_{ps}$  and  $\rho$  are useful as crude indices of similarity-dissimilarity, one needs to look further in cases where these two statistics might obscure such divergent trends as are cited above.

Let us consider, first, all pattern comparisons for the nine Kuder scales for all *S* groups. It seems wise to treat these separately, since these nine scores form a sort of unitary base against which all groups may be compared. This is the nearest one comes to a standard battery. Since different aptitude tests are involved for the different occupational areas, no such over-all standard comparison may be made for all patterns.

The values for  $r_{ps}$  and  $\rho$  for all inter-comparisons of the Kuder profiles discussed in previous chapters were computed. The over-all mean values for  $r_{ps}$  and for  $\rho$  (both computed by Fisher's "squared  $r$ " method) for all *S* group patterns based on Kuder scores are .32 and .59, respectively. The latter value just meets the 5 per cent level criterion. This is, admittedly, only an impressionistic

view of the whole problem; it is felt that little is to be gained by such "total results," satisfactory as they may be.

Turning for the moment to a consideration of the similarity-dissimilarity indices between all *S* group profiles based on the other (non-Kuder) aptitude tests: such profiles should confirm, even augment in some cases, the divergent trends found when the Kuder profiles were compared. The problem is somewhat special, since one cannot deal with any standard test battery as a unitary base. What may be done is to sort out distinct occupational areas for which there are common psychometric data, then run inter-comparisons among these. Three such "pattern frames" were available, the largest containing a total of ten measures, the smallest, six. For example, the sales and engineering *S* groups could be compared for profiles based on ten scores: ACE "Q" and "L," the three part-scores from the Clerical Aptitude Test, both scores from the Pegboard, Paper Form Board, Bennett Test of Mechanical Comprehension and A-S Scale. The two clerical subgroups, the engineers, and the salespeople could be compared as to profiles based on seven psychometrics: ACE "Q" and "L" scores, the three clerical scores, the Paper Form Board, and the A-S Scale. The accountants might be contrasted against all other *S* groups for six scores: all of the previous list with the exception of the Paper Form Board.

These are not, of course, the "ideal" batteries that would be administered to clients expressing such occupational goals as here indicated. In cutting down on the number of tests in this fashion, one sacrifices some discriminating test data. It is to be expected that best results (in the sense of demonstrating clear differentiation of profiles) will be obtained by the

more extensive batteries or, at any rate, batteries that are loaded with highly relevant measures. If, however, with so limited a range of psychometric data as here assembled, the occupational aptitude profiles are shown to be distinct, the utility of such group patterns for vocational and educational guidance is established.

#### A. ENGINEERS

The Kuder profile of the *S* group here is most clear (i.e., zero or negative indices indicating dissimilarity) when set against profiles for salesmen, accountants, and general clericals. Only low similarity is shown when set against specialized clerical workers. The general distinctiveness of this engineering interest pattern is shown by the mean  $r_{ps}$  and  $\rho$  values for all comparisons of .28 and .51, respectively. In terms of the non-Kuder test profiles, the engineer *S* group pattern is distinct for all comparisons—no  $r_{ps}$  value is higher than .33; all  $\rho$ 's are low.

#### B. SALESMEN

There is very clear differentiation for all comparisons, with but one exception. Most contrasts produce negative indices for the Kuder profiles, the exception being that of the sales *S* group pattern set against the general clerical workers. Here  $r_{ps}$  is .75 but  $\rho$  is only .58 (not significant). The superior clerical and computational scores of this general clerical subgroup serve well to demarcate the pattern from that of the sales group, where both of these scores are at the mean.

For the non-Kuder pattern there is again relatively high agreement in terms of another business field: accountancy. For all other contrasts (as against engineers, specialized clerical workers, and



general clerical workers) the indices show low or negative relationships. Attention is called to the fact that, whereas the Kuder profiles between the sales and general clerical samples were moderately similar, the non-Kuder profiles augment all differences and show the two groups to be distinct.

#### C. ACCOUNTANTS

The Kuder profile based on this S group is very clear when set against such patterns as those for engineers and salesmen; moderately high similarity is seen when the pattern is contrasted with those for the two clerical subgroups. The trend, however, disappears when the non-Kuder aptitude measures are taken into account.

The accountancy-sales contrast is peculiar in some ways. The Kuder profile comparison between these two showed low similarity; the non-Kuder contrast shows a high  $r_{ps}$  (.60) but a low  $\rho$  (.10). It is particularly incumbent upon the counselor, then, to deal with the individually distinguishing features of these profiles rather than any over-all similarity or dissimilarity.

#### D. GENERAL CLERICAL WORKERS

There is very clear differentiation for the Kuder profile here as against that for engineers; moderately high similarity, as expected, when set against the specialized clerical workers and the accountants—both somewhat similar business groups where clerical functions play a role. There is, in addition (and rather unexpectedly), moderately high similarity when the pattern is set against that of the sales Ss. The similarity here, however, is more apparent than real, as has been previously noted. Considering the aptitude test scores other than the Kuder,

all of the similarity indices for all comparisons are low or negative. This is one of the most clearly differentiated patterns.

#### E. SPECIALIZED CLERICAL WORKERS

The same dissimilarity trends, but here augmented, are repeated when this Kuder S group profile is considered, but with the reservation in the case of the sales contrast. Here the comparison between the specialized clerical workers and salespeople shows low similarity. This is another line of evidence exemplifying the relatively meaningless quality of the over-all term "clerical" when applied to an entire occupational area. Similarly, clear differentiation is seen for the non-Kuder profile. All indices are low or negative. Again, the specialized clerical workers are seen to be markedly different from other business groups.

#### F. CONCLUDING NOTE

In summary, it has been shown that the underlying assumptions of the concept of the occupational aptitude pattern have held up when diverse occupational areas are set against each other. Evidence has been presented in this chapter to show how the patterns of dissimilar occupations are unlike, and to show that patterns of similar occupational fields are similar but not identical. If this were not the case, all previous discussions in terms of contrasted groups (S versus F) within a particular occupational area would be vitiated.

The Kuder patterns, since they form a type of standard basis upon which many comparisons may be made, have practically by themselves often supplied discriminative information. The writer feels this is rather eloquent testimony

to the utility of the Kuder Preference Record as a differentially diagnostic tool. When, however, these interest patterns are coupled with those based on other tests, still clearer differentiation between unlike groups occurs.

Counselors are urged, nevertheless, not to work with such over-all comparisons except in the most general of ways. These over-all comparisons are mainly useful as a demonstration of the value of the

pattern concept. For effective counseling, where such test pattern data are to be incorporated, one needs more refined standards. Counselors are advised to return to the tables and discussions where the various significant *S* versus *F* versus population differences for each occupational area are presented, and where levels of inter-scale (Kuder) and inter-test (non-Kuder) significant group differences are summarized.

## CHAPTER XIV

### SUMMARY

IN THE light of the stated aims as presented in chapter I, the following general summary is made.

1. A pilot study showed the feasibility of contact of a large counseled veteran sample by means of a mail questionnaire.
2. A questionnaire scoring system was devised to delineate those who, with respect to their pursuit of the stated and approved goal, could be placed in a Success (*S*) or Failure (*F*) group.
3. Comparison of first versus second waves of returns showed the two sets of respondents were similar in many ways. The average time lapse for all respondents ( $N = 890$ ) between receipt of the questionnaire and the replies was approximately one and one-half years.
4. In most respects the Public Law 346 group (non-disabled) was similar to the Public Law 16's (disabled). For the construction of occupational profiles this distinction could be abandoned.
5. A random sample of the non-respondent group after two mailings was contacted. The only significant change necessitated by these new data released to the estimated number of Failures (*F*s), which was increased, as was also the case for the "never began's." This meant, concomitantly, a slight reduction in the size of the "continuing" group. On all other counts, the data from this non-respondent check agreed well with that obtained from the first two waves of replies.
6. Two cut-off points were established on the basis of the distribution of scores applied to clients' replies to questionnaire items (the *Q*-score) which well demarcated a Success from a Failure group. Maximum efficiency of segregation in terms of the "drop's," "never began's," "continue's," and "complete's" was secured. The *S* group was somewhat superior psychometrically to the *F* group; the *S*s were significantly more advanced educationally and were younger.
7. The concept of the occupational aptitude pattern is presented and a procedure set up for obtaining relevant data from this large veteran group, all of whom had been counseled in terms of occupational objectives. An experimental-type plan involving *S* versus *F* groups was proposed, together with certain reliability and validity checks on data so obtained. Occupational aptitude patterns have been presented for groups of engineers, salesmen, accountants, and two clerical subgroups.
8. The engineering pattern provided clear differences regarding *S* versus *F* groups, as well as clear departures from population means. The *S* group pattern was consistent with outside data. The *S* and *F* patterns were shown to be conventionally reliable as well as valid when, in the latter case, the findings were tested against a group of successful engineers. The pattern for the *S* group was distinct when set against those for other occupational areas.
9. The sales group patterns evidenced few *S* versus *F* group differences; these were somewhat augmented when the non-Kuder measures were profiled. Differences from population means were prominent, particularly with the *F* group, the *S*s testing around the mean on practically all measures. An external consistency check on the Kuder data showed generally good agreement; what discrepancies there were occurred only

in terms of the non-relevant interest scales. The patterns were shown to be conventionally reliable, and evidence was offered in support of a claim for validity. The *S* group pattern was shown to be dissimilar when set against unrelated fields; moderately similar to related ones, such as accountancy.

10. The accountancy *S* versus *F* groups were better differentiated by means of the non-Kuder aptitude tests than by the nine Kuder interest scales. There were, however, clear population differences on both counts. An external consistency check corroborated the Kuder data for the *S* group; the split-half reliability technique showed this group to be consistent. Evidence was also proffered to substantiate a validity claim, but this is based only on the somewhat meager data supplied by one other study. The *S* group pattern was clearly distinct from those patterns based on non-related areas; moderately similar to related ones.

11. Before the clerical group could be treated in any adequate fashion, it was necessary to divide this into two subgroups: "general" versus "specialized clerical" workers. This was effected by means of the code numbers as given in the *Dictionary of Occupational Titles*. Such an over-all designation as "clerical workers" proved to be too indiscriminating for fruitful analysis.

a) Clear differences emerged when the *S* group was set against the *F* group of the general clerical workers, although

such differences were not many. This was also the case when the groups were compared with population means. The data were shown to be externally consistent. A validity check here gave questionable results. The pattern, however, was one of the clearest, especially in terms of non-Kuder scores, when set against *S* group patterns from other occupational areas.

b) For the specialized clerical subgroup, clear differences were noted for *S* versus *F* groups. Both groups, however, tended to be indistinguishable from average. An external check for this group data attested to consistency; a validity check indicated good agreement with data from other sources which dealt with successfully employed workers in this category. The *S* group pattern was shown to be different from the pattern of other business groups.

c) A kind of indirect reliability check, which contrasted these two *S* and two *F* groups, demonstrated the dissimilarity of these pairs, especially in terms of aptitude tests other than the Kuder.

12. Finally, the *S* group patterns based on unrelated occupational areas have been shown to be distinct when inter-occupational comparisons are made; those based on related occupational fields show moderate—but not high—similarity. The concept of the occupational aptitude pattern is thus justified in terms of such over-all similarity-dissimilarity contrasts.



## QUESTIONNAIRE

Name .....

Objective as in VSC files: ..... Date last visit .....

- If you have a full-time job (NOT on-the-job training as in questions 9-16):*

- TO BE ANSWERED BY EVERYBODY:**

- PLEASE USE REVERSE SIDE FOR ADDITIONAL REMARKS OR FULLER EXPLANATIONS



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